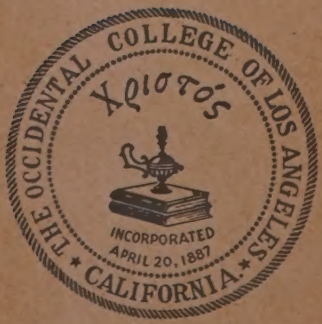
POPULATION

CARR-SAUNDERS

THE WORLD'S MANUALS

312 Carr-Saunders
C319
Population
21390



Book No. 312 C 319

21390

APR 8 60
JUN 3 1955

OCCIDENTAL COLLEGE LIBRARY

MALTHUS

Population

By

A. M. Carr-Saunders

OCCIDENTAL COLLEGE LIBRARY

LONDON
Oxford University Press
Humphrey Milford
1925

CONTENTS

		PAGE
1.	Censuses	3
2.	Increase of Population	7
3.	History of Population	12
4.	Theory of Population	22
5.	Optimum Density	32
6.	Birth Control	54
7.	World Population in the Future	67
8.	Population and International Relations	72
9.	Density of Population	95
10.	Quality of Population	103
	BIBLIOGRAPHY	112

The *Frontispiece* is a portrait of Thomas Robert Malthus, from the copy at Jesus College, Cambridge; reproduced by their kind permission

I

THE first census was no doubt made by the chieftain of some tribe who wanted to know how many fighting men he had at his disposal. This it will be remembered was the motive that led David to order Joab to number the people. Joab did not find out the total population, but merely the number of 'valiant men that drew the sword'. At a rather later period of history when conditions became more settled another motive arose. Rulers wished to know the number of their subjects in order that taxation might be made more effective. Whatever reason may have originally induced the Romans to undertake a census, it is clear that at the period to which the Gospels refer the census was an instrument of taxation. 'There went out a decree from Caesar Augustus that all the world should be taxed.' The word which is translated as 'taxed' in the Authorized Version is translated as 'enrolled' in the Revised Version, though the enrolling was clearly only a prelude to taxing.

These early censuses aimed at ascertaining, not the total number of the people, but merely the number of a particular element in the population—at one time the number of men of military age, at another time the number of men who could afford to pay taxes. The very fact that there were these motives in taking the census must have made them often inaccurate. It is said that when in 1711 a census was taken in China in connexion with the poll tax and military service, the total arrived at was 28 millions, but that when some years later another census was taken with a view to certain measures for the relief of distress, the total arrived at was 103 millions. Since, however, ancient records have nearly all perished, we

need not concern ourselves with their accuracy. The system of taking a census of the whole population was begun little more than a hundred years ago and for earlier periods we can only make guesses. For certain periods material exists which enables us to calculate the population of particular countries with a fair degree of accuracy. Thus Domesday mentions 283,242 people, but as it omits women, children, ecclesiastics, and the whole population of four counties we can only form a rough estimate of the total population. Generally speaking, the earlier the period the less reliable is any guess that can be made.

The taking of accurate censuses began in some countries in the eighteenth century. The first census in England was taken in 1801, and was due in part to the impression made by the famous book published by Malthus a few years before, of which more will be said later. A bill had been introduced into Parliament some fifty years previously providing for a census, but it was defeated. The dire results of the census which David forced Joab to make were quoted by those who opposed the measure, and it was prophesied that some 'public misfortune or an epidemical distemper' would follow if an enumeration was attempted. All civilized countries now take a periodical census. The most remarkable achievement has been in India, where the difficulties are obviously very great because so large a proportion of the population is illiterate. It is estimated that about three-fifths of the population of the world is now periodically enumerated by a census taken in such a manner that a high degree of accuracy is ensured.

Thus those countries for which trustworthy figures are available are the countries inhabited by white men, and countries such as India and Java inhabited by races over which the white man rules. Primitive races have not reached a stage at which the uses of a census are apparent to them, while the

idea of so doing is abhorrent to the oriental mind. The oriental view of the need for a census is well illustrated by the reply which an Englishman once received from a Turkish official to whom he had applied for statistical information. 'The thing you ask of me is both difficult and useless. Although I have passed all my days in this place, I have neither counted the houses nor inquired into the number of the inhabitants; and as to what one person loads on his mules and the other stows away in the bottom of his ship, that is no business of mine. But, above all, as to the previous history of this city, God only knows the amount of dirt and confusion that the infidels may have eaten before the coming of the sword of Islam. It were unprofitable for us to inquire into it.'[1]

So when we ask what the total population of the world amounts to we can only make a guess, because trustworthy figures are available only for some three-fifths of the world's inhabitants. Nevertheless it is unlikely that our estimate is seriously inaccurate. It works out at 1,700 millions. This fact in itself means little or nothing. When, however, we go a little farther and inquire how this figure is arrived at, we soon meet with facts that suggest interesting and important problems. We can find out what proportion of the total population the white, brown, black, and red races of mankind respectively contribute. We can analyse further, and ascertain the populations of the various countries occupied by the white race. Then, since we know the area of the different countries, we can calculate and compare their populations in respect of density, that is to say, the number of inhabitants to each square mile or to any other unit of area. The population of each country can be divided into those who live in towns and those who live in the country, and the comparison of one country with another in respect of the proportion which the town-dwellers bear to the total

[1] McDougall, *Social Psychology*, 11th edition, p. 316

population yields very interesting results. We can analyse the population in respect of sex and find out whether the men outnumber the women or vice versa. We can analyse the population in respect of age, and such an analysis brings to light the interesting fact that in some countries the young people form a much larger proportion of the population than in others.

It is obvious that in the analysis of the figures obtained by a single census there is a very large field of inquiry. There is, however, another aspect of the whole matter which is disclosed when we compare the results of a census taken in any year with the results of censuses of the same country taken in other years. Such comparisons show that the total population of any country rarely remains the same even for a short period. The figures show that the population of almost every country has been increasing with considerable rapidity during the last hundred years. It is calculated that the population of the world is increasing every year by some 15 to 20 millions. In other words, the annual increase of the population of the world is equivalent to between two and three times the population of Belgium. Clearly the questions connected with the increase of population are of greater interest than those connected with the analysis of the population as it exists at any given time. Further, an inquiry into the increase of population leads us directly to study the fundamental matters which govern the whole situation. It is evident, therefore, that it is with this aspect of the matter that we may best begin our present inquiry.

It is common knowledge that for the last hundred years the population of England has been increasing. It is also generally known that the population of nearly every other country in which a periodical census is taken is on the increase. That population should increase has thus come to seem 'natural'. The condition in France in which the increase has now for some time been negligible appears to be abnormal. Most men if they were asked what the normal condition has been throughout recorded history would no doubt reply that an increasing population was normal. Let us ask how far this view of the history of population is correct.

It has been explained that accurate figures are available only for the last hundred years or so. For earlier periods we have to rely on estimates. Though the estimates for the population of England and Wales for any date before 1800 vary, they do not vary so considerably as to invalidate the broad conclusions that we shall draw. We may therefore take the estimates of one authority without discussing how far they may be in error because, had we taken the figures of any other authority, they would have led us to the same general conclusions.

ENGLAND AND WALES

Date.	*Estimated population.*	*Density per square mile.*
1066	1,500,000	26
1381	2,350,000	40
1415	3,000,000	52
1509	4,000,000	69
1528	4,356,000	75
1603	5,000,000	86
1625	5,500,000	95
1660	5,500,000	95
1714	5,750,000	99
1760	7,000,000	121

From 1801 we have the census figures.

ENGLAND AND WALES

Date.	*Population.*	*Density per square mile.*
1801	8,892,536	153
1811	10,164,256	175
1821	12,000,236	207
1831	13,896,797	239
1841	15,914,148	274
1851	17,927,609	309
1861	20,066,224	346
1871	22,712,266	391
1881	25,974,439	448
1891	29,002,525	500
1901	32,527,843	561
1911	36,070,492	621
1921	37,885,242	649

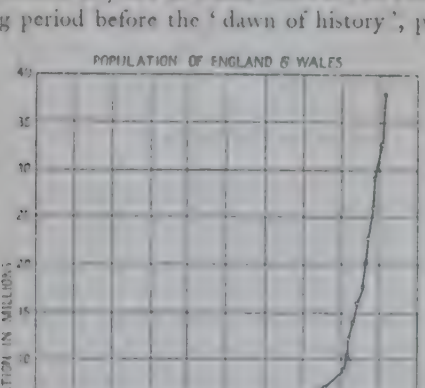
The significance of these figures is easier to grasp if we put them in the form of a graph which, if inaccurate in detail, serves to show the trend of the growth of the population of England and Wales in the last 900 years.

We see that the population of England and Wales increased slowly for 700 years, and more quickly from 1700 to 1800, and then shot upwards with a rapidity previously unparalleled. During the same period the continent of Europe was more subject to the effects of war and other devastating influences than England and Wales; but figures, so far as they exist, show that the same general tendencies were at work. As in England and Wales, the population tended to increase slowly for many centuries, and then in the nineteenth century increased with very great rapidity.

So far it seems that the common opinion to which we have referred has some justification in fact, though it is not generally recognized how rapid has been the increase in the last century compared with the times that went before. Some three or four thousand years of recorded history lie behind the earliest date to which we have referred, but since for these periods material

to form estimates as precise as those which we have quoted is lacking, we must postpone what there is to be said about the movement of the population in those times until we have discussed a still more distant period.

Behind the six thousand years or so of recorded history lie tens of thousands of years of which there are no records. For a very long period before the 'dawn of history', perhaps for



100,000 years and very likely longer, men had been making tools, using fire, and no doubt ordering their lives according to an elaborate code of rules. To gain any real understanding of the history of such a subject as population, we must not leave this period out of account. If we do so, we arrive at an altogether distorted view. But, it may very well be asked, how can anything be known about this period, seeing that the history of it was unrecorded? The answer is that while nothing is known about the period directly, there is a method by which we can throw light upon it.

From the scanty remains which men of this period have left behind them, it appears that for the greater part of the time, for not less than perhaps 100,000 years, they supported themselves by hunting and fishing, knowing nothing of agriculture. Now it so happens that some races of men never discovered a better way of making a living, and have continued to support themselves in this manner to the present day. Such is the case, for example, with the natives of Australia. Other races learnt the arts of primitive agriculture and of the domestication of animals; but again, some of them went no farther and never, for example, learnt the use of the plough. That is the position of many of the native races of Africa. Other races learnt the use of the plough and again some of them progressed no farther, while others became acquainted with those arts which are regarded as part of the equipment of the so-called civilized races. Here then is a method by which we can gain an insight into the conditions that men lived under during the prolonged period before the dawn of history. From the study of existing hunting and fishing races, we can learn something of the manner in which our own ancestors lived for many thousands of years. Similarly, we can employ our knowledge of existing primitive races which practise an elementary form of agriculture in order to throw light upon the next stage in the 'prehistoric' period.

Let us therefore inquire what information we have regarding the density and rate of growth of population among primitive races. First as to density. There are no accurate figures. We have merely a number of estimates. It is estimated that in Australia before the arrival of the white men there was about one man to every 15 square miles. Population may have been even more sparse among other races, and, generally speaking, we may say that it is very unusual for a race that has no knowledge of agriculture to reach a greater density than one to the square mile. How sparse a population even such a figure

indicates may be gathered when we recall that in 1921 there were in England and Wales 649 people to each square mile. Among races that practise a primitive form of agriculture the number may rise from something over 1 to 10 or 20 or even to 30 or 40 to a square mile. No rule can of course be laid down. But from a survey of different races employing different forms of skill in order to procure food, it appears that the more skilled a race is, the denser is its population, at least as a general rule. Agricultural races are more skilled than hunting races, and have as a rule denser populations; while the more skilled agricultural races have a denser population than the less skilled agricultural races.

From a study of existing primitive races, therefore, we learn this much about the conditions under which our forefathers lived before their doings came to be recorded and handed down to subsequent generations as history: Population was very sparse, but where skill was greater it was rather more dense. But improvements in skill were made very slowly. We know this because the implements which our forefathers used are found in the soil in the floors of caves and other places, and, rough as our calculations are, we can estimate that thousands of years must have elapsed between the time when the lower and the upper layers were deposited, during which time very little advance, relatively speaking, was made in skill. We are thus led to believe that in those times population must have been stationary as a general rule; for long periods of time there were no improvements in the arts of food production and so no change in the density of the population. Further, when improvements did take place they were small improvements, and probably came slowly, with the result that such increase in density as they permitted must have been imperceptible to any one then alive.

This early period of which we have been speaking was many

times—perhaps twenty or thirty times—longer than the whole historical period put together. It follows, therefore, that if we take a long view and study the human race from the earliest times, we must regard an increasing population as less usual than a stationary population. By taking a long view we see present conditions in their proper perspective, and are led to inquire whether there may not be a return in the future from the present condition of rapid increase to the more normal condition of a stationary population. That is one of the many points that await discussion. Meanwhile it may be noticed that increase during the historical period has, as a general rule, been continuous and, compared with earlier times, rapid. Even the rate of increase during the period succeeding the Norman Conquest which we called slow compared with the rate of increase during the last century was infinitely more swift than any which could ever have taken place in 'prehistoric' times.

3

When we recall how great the power of increase is with which the human race is endowed, these facts as to the increase of population become still more remarkable. Many calculations have been made to show how huge this power of increase is. It has been calculated, for example, that the descendants of a single pair of human beings increasing at the rate of 1 per cent. per annum would amount in a little more than 2,000 years to 1,700 millions, that is to say, to a total equal to that of the present population of the world. Now 1 per cent. per annum is about the present rate of increase of the population of the world as a whole, and it is obvious to every one that only a fraction of the power of increase is actually realized at present. Many people do not marry, many married couples are childless, and few have as many children as they might have. Therefore even such a rate of increase as that which is now taking place

falls very far short of the possible rate of increase. Or the facts may be put in another way. Let us suppose that the 1,700 millions of people now inhabiting the world were to continue to increase at the present rate, namely 1 per cent. per annum, then in 500 years from now the population would amount to 246,114 millions. Why, throughout great tracts of human history, has not this vast power of multiplication resulted in any increase of population? And why, at other times, has the increase realized fallen so far short of the possible increase?

It might of course be urged that the power of increase has not always been of the same strength. In fact, it has often been suggested that the power of multiplication has changed in the course of human history. Herbert Spencer, for example, was of the opinion that as men become more intellectual their power of increase, or what we may for short call their fecundity, decreases. Our knowledge concerning this matter is incomplete, but there is no evidence in favour of Herbert Spencer's suggestion, and therefore no support for those who would explain the decline in the birth-rate at the present day by a decrease in fecundity. There is a considerable amount of evidence, on the other hand, to show that in early days fecundity was not as great as it is now. Existing primitive races seem to have a smaller power of multiplication than civilized races, and it is reasonable to suppose that our forefathers were in early times in the same position as these races. But this is after all only what we should expect. When wild animals are domesticated, their fecundity increases; the pig is more fecund than the wild boar. Now domestication means improved shelter and better and more regular food, and in this sense civilization may be regarded as the domestication of human beings. Thus if domestication increases the fecundity of wild animals, so civilization may have increased the fecundity of the human species.

Yet, even if the power of multiplication has increased, the

problem still remains. Let us suppose that the fecundity of early races was only half that of civilized races (and the difference between ourselves and our forefathers in this respect was certainly nothing like as great as this); even then an increase at a rate much exceeding 1 per cent. per annum would have been possible. So after allowing for the probability that fecundity has increased we are still faced by this problem: why in early times as in later times has this power of multiplication not actually been realized? And this is so because the lowest degree of fecundity that we have any reason to assume is more than sufficient to enable its possessors to increase at the swiftest rate that has yet been observed among human beings.

There are two things, either of which, had it happened alone, could have produced the conditions described. In fact they were at all times in operation together. First, the power of multiplication was never exercised to the full. And, secondly, a considerable proportion of those born never reached maturity and thus never propagated their kind. In any society in which some people do not marry, or in which restrictions of any kind are placed upon the intercourse between married people, or methods are adopted to interfere with the natural results of intercourse, or abortion is practised, or new-born children are killed, the power of multiplication is not being exercised to the full. Wherever any part of the population is carried off by war, famine, disease, or exposure before maturity, the power of multiplication is in some degree being rendered ineffective. When the number of children born is small compared with the number that might be born, we say that the fertility is low. When the number which reach maturity is small compared with the number that might reach maturity, we say that the amount of elimination is large.

It is a matter of very considerable interest to inquire into the causes which at different epochs in the past have prevented the

full power of multiplication from being realized. For any given period we must ask whether fertility was low, and if so for what reasons, or whether elimination was large, and if so, again, for what reasons, and unless we are in possession of the answers to these questions our picture of the social conditions must be very incomplete. The inquiry has an added interest for us because some knowledge of what has been happening in past times enables us to probe more deeply into the main problem, and to get some idea of what, for instance, is meant by over-population. We shall examine first the conditions prevailing in the prehistoric period, and then pass on to historic times.

As explained above, our knowledge of early times is indirect. We examine the conditions which prevail among existing primitive races and assume that conditions among our forefathers, when in a comparable stage of social evolution, must have been somewhat similar. Such an examination shows us that the fertility of practically all primitive races is very low. The number born (or, in the case of those races which practice infanticide, the number that survive more than a few days) is small. The average may not exceed four to a family. Since among these races almost all men and women marry as soon as they are physically capable of so doing, neither celibacy nor postponement of marriage is the cause of this low fertility. The cause is to be sought in the practise of certain customs, prolonged abstention from sexual intercourse between married people, abortion and infanticide, one or more of which have been extensively practised by almost every primitive race. Thus throughout the greater part of Africa the native races abstain from intercourse for three years or more after the birth of a child. This custom is also found in Polynesia, where in addition abortion and infanticide are practised. Among the Indians of America infanticide was common and abortion

fairly common. No matter in what quarter of the world we look, wherever there are native races one or more of these three customs is practised except where native customs have been destroyed by European influence.

It is interesting to notice that these customs were not practised sporadically among primitive races, or in times of pressure only, as when, for instance, a famine threatened. They were strictly and regularly practised, and there was strong public feeling against their contravention. Thus in the island of Funafuti every mother was allowed to keep alternate children, the second, fourth, and sixth being destroyed. In other places all children above a certain number were killed; in Tikopia, for instance, the number allowed was four. In Radeck 'every mother', one observer tells us, 'is allowed to bring up only three children; every fourth and succeeding one she is obliged to bury herself'. Speaking of Fiji, another observer tells us that 'the relatives of a woman take it as a public insult if a child should be born before the customary three or four years have elapsed, and they consider themselves in duty bound to avenge it in an equally public manner'. There is a very large amount of information from different parts of the world to the same effect. We are led to the conclusion that fertility among these races was everywhere consistently low as the result of the regular practice of one or more of these customs.

What, on the other hand, was the position of these races as regards elimination? The popular idea seems to be that their numbers were kept down by famine and disease which made great ravages among them. Because they had little knowledge of how to store up food, they often went short at certain periods of the year; but the evidence seems to show that death from want of food was a very rare occurrence. They were certainly less subject to disease than are civilized peoples.

Disease is in a certain sense a product of civilization, and it is probable that many of the diseases from which we now suffer were evolved quite late in the history of the human race. In any case we must attribute less importance to disease as an agent of elimination among primitive races than among civilized races. Again, the importance of war as a cause of casualties among these people has been greatly exaggerated. War plays a great part in their lives, and no doubt they commonly spend some part of every year in fighting. But it is usually a harmless kind of warfare, and in the nature more of a sport than of the deadly work it has become among civilized peoples. Exposure to all conditions of weather and injudicious methods of feeding undoubtedly kill off many of the young. Nevertheless when we sum up this side of the account we find that the amount of elimination was not great; certainly it was very much less than is popularly supposed.

One aspect of the position deserves notice. Whatever the amount of elimination may have been, it was approximately constant. War, disease and the other factors at work carried off about the same number of people every year. We have already noticed that fertility was kept down to a consistently low level. Let us translate this into imaginary figures. Let us suppose that in one of these races two members of every family, on the average, died before reaching maturity, and that it was the custom to kill every child after the fourth. Under those conditions numbers would remain stable. A review of what we know of primitive races leads to the conclusion that under normal conditions this was what actually happened. There was always a certain degree of elimination – more in some cases than in others, as where war, for example, was really bloodthirsty – but, whatever the degree may have been, customs limiting fertility were practised just about as far as kept numbers stationary. This, it may be noticed in passing, is

very different from the position obtaining among animals in a state of nature, and therefore very different from the conditions which must once have obtained among the pre-human ancestors of man. Among species in a state of nature the power of multiplication is realized to the full because there is no check upon intercourse and no custom corresponding to abortion: no difference between fecundity and fertility. If numbers remain about the same from year to year, as is commonly the case, it is because the excess is eliminated by one means or another. It is elimination that keeps stable the numbers of a species under natural conditions. But among primitive races customs which produce a low degree of fertility are ultimately responsible for keeping numbers down. These races do not increase, as they might, until famine or ruthless warfare thins their numbers.

This examination of primitive races has given us an insight into the conditions which presumably prevailed among our ancestors at a time when history had not begun to be recorded. We must now make an equally rapid sketch of the conditions among those races whose history has been recorded and of whom, therefore, we have direct knowledge. First as to fertility. Except in a few isolated instances, celibacy and postponement of marriage were unknown until the Christian era. In most Asiatic countries they are still unknown. Therefore, except in Europe during the last two thousand years, they have not been a check upon the power of multiplication. There is little evidence in historic times of the existence of customs imposing prolonged restraint from intercourse upon married people. There is, however, abundant evidence of the practice of abortion and infanticide in Asiatic countries up to within living memory and in Europe up to the beginning of the Christian era. The former prevalence of infanticide in India and China is well known; equally well known is the fact that

the Greeks in classical times regularly exposed their infants, while the Romans practiced both infanticide and abortion. Especially interesting is the fact that, when we can catch sight of races emerging out of prehistoric into historic times, we find them practising one or other of these customs. Thus when the Germans first came into contact with the Romans they were practising infanticide, and when the Norsemen in Iceland were converted to Christianity they stipulated that their right of killing their children should not be taken away from them. The situation may be summed up by saying that, except in Europe for the last two thousand years, fertility was rendered low and a limit set upon multiplication by much the same means as in prehistoric times.

The Christian era witnessed a profound change. Abortion and infanticide were rendered illegal. While to the influence of the Christians themselves, who set their faces against these practices, a large share of the credit is due, it is only right to remember that the growing humanitarian sentiment among those who were not Christians also played a part. The change was not abrupt and these practices lingered on for some centuries in Europe. At the same period, for the first time in the history of the world, celibacy and postponement of marriage became common. As the former practices went out, so the postponement of marriage came in, and throughout the Middle Ages we find that there were agencies at work which enforced it, in part by legal enactment, but chiefly by the pressure of customs and conventions. These varied from time to time and from country to country. We are told that before the Reformation in England 'not only were early marriages determinedly discouraged, but the opportunity for them did not exist. A labourer living in a cottage by himself was a rare exception to the rule; and the work of the fields was performed generally . . . by servants who lived in the families of the squire

or farmer, and who, while in that position, commonly remained single, and married only when by prudence they had saved a sufficient sum to enable them to enter some other position.' At the same period there existed in the towns a system of compulsory apprenticeship, and until the apprenticeship was terminated youths could not marry. Thus in many ways both in town and country a steady pressure was exercised upon the youth of the nation whereby they were discouraged, if not prevented, from marrying early.

This system, if system it can be called, gradually gave way, and the profound changes which industrialism brought about in social conditions finally put an end to it. All barriers to marriage in the shape of laws, customs, and conventions vanished. But the going out of this system of checks upon the power of multiplication was followed by the growth of another system which we know to be in operation to-day. Married people began consciously to limit the size of their families. The date when they began to do so and the methods employed will be referred to later. Here it is enough to point out that it is conscious limitation and not abstinence from marriage or postponement of marriage which dominates the position in our time, although every one does not marry, and those who do marry do not as a rule marry as young as they might.

We must now glance for a moment at the part elimination has played among the races in historic times. Disease becomes far more important. Not only have new diseases been evolved, but the herding together of men in towns under unsanitary conditions has enabled disease the better to do its deadly work. During the last hundred years or so we have made a determined and largely successful effort to cope with disease. Previously, however, throughout the historic period disease has been rampant and the death-rate high : plagues and epidemics have from time to time swept through all countries. Warfare itself

has become more deadly, but it has been chiefly through its indirect effects by promoting disease and famine that it has assumed an increased importance as an agent of elimination.

Looking back, therefore, over the historic period we see that the old checks upon the power of multiplication remained in operation in Europe up to the beginning of the Christian era and have scarcely yet died out in Asia. During the last two thousand years new checks have taken the place of the old ones in Europe. At the same time we get the impression that these new checks were less systematically applied and possibly less effective than the old. This is perhaps not unconnected with the fact that the amount of elimination was probably not so regular as before. Seldom can it have been the case that in any civilized country during the last two thousand years the number of those surviving to maturity remained at all constant for any considerable period of time owing to the frequent but irregular occurrence of plagues and famines.

An historical sketch, such as we have just attempted, brings us up against problems of the greatest interest and importance. We have seen that, if we regard history as a whole, a stable rather than an increasing population has been the rule. Further, during those periods when population was increasing as well as when it was stable there has always been some system in operation which has had the effect of preventing the inherent power of multiplication being realized to the full. With these facts in mind many questions suggest themselves. Is some such system always desirable? Under what circumstances is an increase in population desirable? What do we mean by over-population?

The most celebrated attempt to review the whole problem of population was made by Malthus who published the first edition of his famous book anonymously in 1798. He acknowledged in the fullest possible manner the contributions to the subject that had been made by previous authors. In this he was, if anything, too generous ; the original and comprehensive nature of his own work puts it in a category by itself. His book gained him fame, but it also brought violent abuse upon him. In this and in other respects there is a certain parallel between Malthus and Darwin. Like Darwin he was courteous in his personal relations and somewhat of a recluse in his habits. Like Darwin he refrained so far as possible from engaging in controversy. He left his supporters and detractors to fight it out among themselves and devoted himself to re-examining the problem and to collecting fresh data.

As was only natural, the attention of thinking men had been drawn from early times to problems connected with population. They cannot be overlooked by those who examine at all deeply into the foundations of society. We find Greek thinkers in the fifth century B. C. asking what was the most advantageous number of inhabitants for a city state and in all ages political writers, in the wide sense of that term, have had this aspect of the problem in view. Again, the fact that there is a connexion between population and the food supply is too obvious to escape attention, and from time to time we find references to this aspect of the problem also. Before Malthus wrote, however, the treatment of the problem had almost always been incidental to that of other subjects. Malthus, indeed, was not even the first author to devote a whole treatise to the problem, but he was the first to undertake a thorough examination based upon an adequate collection of data.

He won his fame, however, not by this alone, but by raising the question at a time when thinking men were for various reasons prepared to give it full consideration. Of these reasons perhaps the chief was the poverty of the workpeople, which was engaging the attention of all who cared for the condition of their fellow men. To this social problem Malthus's book had direct reference. Malthus wrote during the Napoleonic War, and to that war the excessive degree of poverty which then existed must in large measure be attributed. Rather more than a hundred years after Malthus wrote we find ourselves again interested, after another great war, in the problem of population, and we are interested largely because we feel that it has a bearing upon the problem of poverty which faces us at every turn to-day.

Every aspect of the problem has been frequently discussed since Malthus wrote. Nevertheless, in spite of all the contributions that have been made, it is now admitted that, so far as the essential features of his point of view are concerned, Malthus's view was correct. It goes without saying that the actual position requires the most careful re-examination in every age. What then was the essence of Malthus's point of view? We can put it as follows: while a new pair of hands accompanies every new mouth that comes into the world, it is only under certain circumstances that the new pair of hands will produce as much food as is produced on the average by those pairs of hands already in existence and at work. To this must be added the fact, which is in part a consequence of what has just been said, that checks to the increase of population are in operation at all places and at all times owing to the limitation of the amount of food available.

This was the essence of what Malthus said. Before we discuss these statements it is as well, in order to avoid misunderstanding, to recall the fact that Malthus, in elaborating his view, used

certain phraseology upon which undue attention has been concentrated. Population, he said, would, if unchecked, increase in a geometrical ratio, whereas 'the means of subsistence . . . could not possibly be made to increase faster than in an arithmetical ratio'. Opinion differs as to the importance which Malthus attributed to the ratios themselves; some think that he attached great importance to them, while others hold that he used them rather as an analogy than as an exact statement of the facts. However that may be, as an exact statement they are not true; while as an illustration they are unfortunate. We need not pursue the matter further, because, as Mr. Harold Wright has recently said, 'unfortunately for the human race, the essential validity of the Malthusian principle of population is not destroyed by the substitution of an accurate account of the growth of the food supply for the fallacious arithmetical ratio'.

Taking, therefore, the Malthusian principle to be as formulated above, we may ask why under certain circumstances an additional pair of hands may not produce as much as those already at work. The answer turns upon the fact that the amount of land is limited. Only to a very small degree and under very special circumstances, as when, for instance, an area is reclaimed from the sea, can the amount of land be increased. But, while the supply of land is for all practical purposes unalterable, the supply of labour and capital can easily be increased. Every increase in population means an increase in the supply of labour, while capital will increase in at least the same ratio as population.

Let us now ask, bearing these facts in mind, what experience has shown to happen under the following circumstances. We suppose that there is in existence a certain degree of knowledge and skill as regards agriculture and that (a very important part of the supposition) no additions are being made to this stock

of knowledge and skill. Armed with a certain knowledge concerning the rotation of crops, and provided with agricultural implements of a particular kind, men cultivate the soil. Experience has shown that under these circumstances, beginning with the application of relatively small amounts of capital and labour to a given area of land, increasing applications of capital and labour to this same area will be rewarded with proportionately greater increases in produce up to a point. This is the point at which there will be the greatest possible amount of produce per unit of capital and labour applied. Beyond this point further applications of labour and capital will increase the amount of produce, but the increase in produce will be less for every additional unit of capital and labour supplied until at length any further increase in capital and labour will not be followed by any increase in produce.

This is after all only common knowledge. Every farmer knows that it does not 'pay' to use more than a certain amount of labour on his farm and every allotment-holder knows that it does not pay him to work more than a certain number of hours on his piece of ground. An allotment-holder may find that if he works for six hours a week he will get more than twice as much produce as he would get if he worked three hours a week, but that if he increases his labour to twelve hours he will get considerably less than twice as much as he got when working six hours. This is what is meant by the Law of Diminishing Returns. So long as the methods used remain the same, then after a certain point has been reached an increase in the amount of capital and labour applied to the cultivation of land causes a less than proportionate increase in the amount of produce raised.

The law has recently been well illustrated by Mr. Harold Wright, who has drawn an analogy between a shrinking earth and a growing population. The conditions arising when an

increasing population inhabits an unexpanding world are not in all respects quite the same as if a stable population were to inhabit a shrinking world. The differences are small enough, however, to be left out of account. What then would happen if the world shrank until the area of the land surface was half what it is at present? The same amount of capital and labour as before would be applied to half the area, or, in other words, twice as much capital and labour would be applied to an acre. Does any one think that the total amount of produce would not under those circumstances diminish? If he does, let it be supposed that the area shrinks still further to a quarter or an eighth of what it was originally; obviously there must come a point when the produce raised will diminish, for otherwise it would follow that it would be possible to raise the original total from the area of a single field. At a certain point, therefore, in the shrinking of the earth decreasing returns will be experienced, and similarly, if the area of the land surface remains the same while the population increases, there must come a point when returns will decrease, provided that the amount of knowledge and skill remains the same.

This discussion leads to an important conclusion. In any country at any given time there is a certain amount of skill and knowledge available and there are certain habits and customs which govern the use made of this skill and knowledge. Taking all these conditions into consideration, then it is clear that there is a particular density of population which must be reached and must not be exceeded if the largest possible income per head is to be obtained. As we have seen, there is for any piece of land, when a certain amount of skill is available, a point where, by the application of a definite amount of capital and labour, the maximum return per head is reached; if less is applied the return per head will be less, and if more is applied the return per head will again be less, though in this latter case the total

produce will be greater. So in any country, however many complications may be introduced by the rise of industrialism and the exchange of manufactured articles for food grown abroad, there is a density of population which is more desirable than any other from the point of view of income per head. This may be called the 'optimum' density.

Thus far we have assumed that no progress is made in knowledge and no advance achieved in agricultural implements. We have been dealing with static conditions. Let us now suppose that a discovery is made. There was a time when many arable fields in this country lay fallow every third year. At any given time therefore one-third of the ploughed land was not bearing crops. This system was followed because it was found that, if crops are taken continuously, the land becomes foul with weeds and the crops are choked by them, but that, if land is allowed to lie fallow for a year, the weeds can be destroyed and the land cleaned. Then it was discovered that if, instead of the land being left fallow, a root crop was planted, the land could be cleaned while the crop was growing, because it is possible to hoe in between the plants of a root crop. The result was that from any given area of arable land more produce was raised every year, because the whole of the area and not two-thirds only was under cultivation. Again, a larger number of men were employed per acre, because land bearing root crops requires more labour than land lying fallow. Lastly, and this is the most important of the results that follow from such a discovery as this, more produce was raised per man employed. Let us translate this example into figures. We may imagine that four men are employed on every hundred acres of arable land that is bearing crops and two men on every hundred acres that is lying fallow. The fallow land has to be ploughed and cleaned and thus requires labour, though not so much as land that is bearing crops. Therefore, under the old system ten men

will be employed on every three hundred acres, and if we put the produce of one hundred acres under crops at 5 units, the amount produced per man will be 1 unit. Under the new system there will be 15 units of produce and twelve men will be required to raise it. The whole area will thus be producing one-third as much again, and each man will be producing 1·25 units of produce instead of only 1.

It is evident that an improvement such as this in the art of agriculture has a bearing upon the problem of 'optimum' density. In the example given above this desirable density was at first ten per three hundred acres, but after the reform in methods had been made it was twelve for the same area. That is, the point at which the maximum return was reached was pushed farther back. A certain increase in population was necessary if the greatest income per head within reach was to be attained. It is interesting to notice here, because the matter will come up later, that, if the increase exceeded a certain amount, the old position would be reached again so far as income per head is concerned. In the illustration given above it might very well be that if, after the improvement had been effected, the population increased until there were eighteen men for every three hundred acres, the produce would only equal 18 units. Under those circumstances a much larger population would be receiving the same income as before. Such an improvement, if its full benefit is to be felt, only allows of a certain increase of population. It is always possible for population to increase beyond this point until the average income is no greater than it was before.

There is, however, another matter which is of more immediate interest to us here. Additions to agricultural knowledge are not the only changes which alter the point of maximum return. Let us suppose that an improvement is made in methods of transport—say by the invention of railways or of motor trans-

port. Wheat can then be conveyed at less cost to the mill where it is to be ground, and bread will be cheaper. Or an improvement may be made in the machinery used for milling and again bread will become cheaper. Such inventions have no influence upon agriculture itself; nevertheless they affect the whole position.

Similarly, improvements in industrial processes have so important a bearing upon the position that it is worth examining the matter rather more closely. While in the last resort food is possibly the only necessity for man, clothing, housing, furniture and many other things are desired by him even where the standard of living is low. These other requirements are all manufactured out of raw materials, and the law of diminishing returns applies to their production just as it does to food. There is, for example, under any given circumstances a point of maximum return in the production of cotton, just as there is in the production of wheat, beyond which the application of more capital and labour will not produce equivalent returns. But in spite of this fundamental similarity industrial processes are very different from agriculture. Mechanical inventions can be introduced far more easily into industry than into agriculture. Improvements in technique are of almost daily occurrence in an engineering shop, whereas agricultural implements and the daily routine on a farm remain little changed over a period of years. Secondly, division of labour and mass production when applied to industrial processes enormously increase efficiency and output. Thirdly, the cost of raw material represents but a small part of the total cost of production in industry. It results from this that decreasing returns are not experienced anything like so soon in industry as in agriculture. For a long time any increase in the cost of raw materials may be set off by decreasing costs of manufacture, and industry as a whole may continue to show increasing returns.

How then does this difference between industrial and agricultural processes affect the general position? Man requires the products of industry as well as the products of agriculture. Now some improvements in industrial processes can be introduced and made full use of without any increase in population. Other improvements require a larger population if their full benefit is to be felt. Such is the case with specialized tools, for example, which can only be used efficiently when there are enough people in the industry to admit of the division of labour. Further, the vast increase of output which mass production makes possible can only be attained where the population is dense; while, to introduce another point, a dense population is in itself of economic advantage in so far as it decreases the costs of distribution. Therefore even if the population increases to a point where the cost of food goes up, there may be a net gain, because this increase may enable such economies to be made in industry as will more than set off the increased cost of food. Let us see how this works out in practice. No improvements are being made in agriculture. The population increases and the price of food goes up. Every man is now spending a larger proportion of his income on food. But if at the same time the increase in population has made possible such economies in industry that with the remaining part of his income every man can buy a larger amount of clothing, furniture, and other requirements than before, then every man is better off.

It must not of course be thought that this process can go on indefinitely. Sooner or later decreasing returns will make themselves felt in industry. Conditions, however, are on the whole favourable in industry; industry is so responsive to division of labour and mass production that it is the increasing cost of food rather than decreasing returns to industry that is likely to give the whole situation an unfavourable aspect. Clearly enough, if the cost of food increases beyond a certain

312 C 319

point, no imaginable improvements in industry can enable the smaller remaining part of the income to purchase even as much of other requirements as it did before.

So far we have been thinking of a self-contained country—one which does not import or export either food or manufactures. Supposing that the inhabitants of such a country find that any further increase of population causes a decrease of income per head. What courses of action are open to them, short of putting an end to increase of population, in order to maintain their standard of living? Some of them may migrate, or, if their country is well adapted to industry, they may manufacture more industrial products than they require and exchange the surplus for food. About migration there will be something to say later. The latter course of action complicates the position, but does not essentially modify it. It is of the utmost interest to us because it is the course that Great Britain has adopted. We import a large proportion of our food from other countries, and the problem for us is whether the economies in the production of manufactured articles rendered possible by our increasing population can continue to counteract the decreasing returns experienced in the food-producing countries.

If we try and interpret the facts outlined above in the light of the theory that we have just been considering, the most important conception which emerges is that of the desirable density. In any country under any given conditions there is an 'optimum' density of population which, if attained and not exceeded, will obtain the largest income per head that is within reach: a density, that is, which is the most desirable having in view the purely material ideal of the average income of the inhabitants.

21390

When we inquired into prehistoric conditions, we found that in all probability fertility was low and the amount of elimination not high, while numbers remained stable over long periods of time. We were thus led to suppose that, during that vast period of time after society first came into being and before history was recorded, population was sparse but its numbers were stable. How should we interpret these conditions?

In the first place it must be borne in mind that, while fecundity—the power of increase—may not have been so great as it is now, it was always of sufficient strength to enable the population of the world to increase within a few hundred years from scantiness to its present density. At least it was always theoretically possible; though had population begun to move in this direction it would soon have been checked by elimination; lack of food would have produced starvation. The population which is theoretically possible must thus be distinguished from the population which is actually possible at any given time—the latter being limited by the amount of food available. The question we have now to ask is whether the population in past times tended to approximate towards this possible density or only to the desirable density. Evidence of chronic starvation or of semi-starvation of large numbers of people would point to the former conclusion.

The evidence derived from existing primitive races, which is all that we have to judge by, goes to show that death from starvation was rare. It does not give the impression that men lived under the ever-present threat of famine. On the contrary, we gather that their standard of living was about as high as their knowledge and skill made possible. They sometimes experienced lean seasons, especially those tribes which had not learnt how to store up food for seasons when supplies were

short. But scarcity of this kind was inevitable in view of their ignorance and is no evidence that their numbers were too great. Had their numbers been fewer they would still have experienced times of scarcity so long as they remained ignorant how to store up food.

Just as we can find no evidence that numbers were kept down by starvation to the level of the food supplies, so we find no evidence that war had any such result. While among nearly all primitive peoples warfare is common, it seldom results in much loss of life. Weapons may be prominent and the ceremonial of warfare may occupy a large part of their existence, but a fight will often end and honour be satisfied with a few bruises. Even though warfare may sometimes be more sanguinary, normally fighting has no reference to the food supply. It is a universal rule among these peoples that they live in small groups, each of which is for the purpose of obtaining food confined strictly within a carefully defined area. Except in very unusual circumstances warfare has nothing to do with the conquest of territory for food supplies. Fighting is rather of the nature of a ceremony after the due completion of which the two parties retire within their respective territories.

We may recall the theory for a moment. There is a density of population—an optimum number—which is more desirable than any other for these races as much as for civilized races. If they reach and maintain this density, they will attain the best living that is within their grasp, though it may be a very poor standard of life according to our ideas. If their numbers are excessive they will have to put up with a lower standard of life, and before long some of them will be starving or trying to kill neighbours to get food for themselves. To what then does the evidence point? Certainly not to excessive population as being a normal feature of early times. But an excessive population is only too easily produced at any time. How

then is it that an excess did not normally arise among early peoples?

To answer this we must complete our review of the evidence. War, disease, exposure and other causes of death did of course cut off a certain number in every generation before maturity. But elimination from these causes was not large. Further, about the same number would die every year from these causes. At the same time fertility was low. Although every one married as soon as marriage was physically possible, women bore many fewer children than they might have borne. This low fertility was due to one or more of the following customs—prolonged abstention from intercourse between married people, abortion and infanticide. The universal system in early times thus seems to have been one of small families—so small that the elimination which occurred before maturity was enough to result in a stable population. There can be little doubt that the working together of these factors did in some such manner bring about a stable population; the problem is whether the population so produced tended to approximate to the desirable density, and, if so, by what combination of factors this result was obtained.

It is impossible to say exactly what the desirable number is in any given circumstances; the problem is too complicated. But we can form some notion whether numbers are excessive or deficient and whether they approach near to, or diverge widely from, the desirable number. There is, as we have seen, no reason to think that numbers in early times were normally excessive, because, in the first place, starvation was decidedly uncommon. In the second place, where for one reason or another a primitive race had attained a higher level of skill than the neighbouring races, that race was always found to be enjoying a higher standard of life, and we have seen that if their numbers had become excessive this would not have been so.

How is it possible to suppose that this state of things came about? The key to the understanding of the position is evidently to be found in the low fertility. The fertility is low because of the existence of such customs as abstention from intercourse and infanticide. It is not difficult to see how such customs may arise. Primitive races observe innumerable taboos. They refrain daily from many actions because they believe that evil would befall them unless they awaited more favourable circumstances. Thus they may abstain from intercourse before a hunting expedition, while the moon is full, or so long as the mother is suckling the child. They may kill a child in certain circumstances. We are all now familiar with the principle of natural selection, by which we mean that those individuals endowed with peculiarly favourable characters are more likely to survive and perpetuate their kind than their less well endowed competitors. Among animals there are no customs, and selection is therefore confined to the selection of mental and physical characters. But men may be selected not only on account of their mental and physical characters but also on account of the customs which they practise. Obviously selection will seize upon any beneficial attribute whether it is a physical character or a custom. Now we have just seen that customs may arise which diminish fertility. If these customs are beneficial, those who practise them will be selected. And surely these customs are beneficial if they enable those who practise them to maintain numbers at, or close to, the desirable density. May this not be the cause of the low fertility?

This explanation is not unreasonable. To begin with, the maintenance of the desirable density is not merely an advantage; it is a necessity, if the benefit of such knowledge and skill as may be possessed is to be reaped. At any moment numbers may become excessive and reduce the standard of living to starvation

level. We may thus assume that selection will act vigorously in the direction of strengthening customs which reduce fertility to a point at which, after elimination has taken its toll, numbers remain stable. It will continue to act so as to maintain fertility at that level. Customs of this kind are in fact a necessity if society above the lowest conceivable level, or perhaps any society at all, is to be possible. They are a necessity if there is to be any material progress.

Among existing primitive races, therefore, the checks which are set upon multiplication probably result in an approximation of the density of population to the optimum number, and we may infer that similar conditions obtained among ' prehistoric ' races. The evidence concerning early civilizations is too scanty to allow us to judge whether the methods of limiting increase which we know to have been employed by them usually resulted in a similar approximation. But we know enough about these early civilizations to realize that an approximation to the desirable density of population must have been difficult to maintain if not to attain. Both disease and war, for instance, were more important agents of elimination than among uncivilized races. Now disease and war cause more deaths in some years than in others, and thus the number of births required to keep numbers near the desirable level must have varied very considerably from time to time. Again, civilization requires an elaborate organization of society and rests in a greater or less degree upon certain material foundations. The organization of society may decay or the material foundations may crumble. Thus the civilization of Mesopotamia rested upon the irrigation system, and when it was destroyed by invaders a much lower density of population than before became desirable. As contrasted with still earlier times the maintenance of the desirable number was therefore more difficult among early civilizations, and it is probable that

under- and over-population were more frequent. But there must always have been a tendency towards an adjustment of population to the optimum number and, except in Europe from the beginning of the Christian era onwards, the methods in use in 'prehistoric' times were still employed. Infanticide was employed in India and China until recently; it has now been abandoned and no other method of keeping the size of families small has taken its place. An examination of the social conditions in these countries suggests that the people are not living as well as they might; famines are not uncommon and are never far off. The symptoms point to over-population, of which the cause would seem to be the failure to replace the custom of infanticide by some other method of regulation.

It is Europe, however, which is of most interest to us. We have seen that the introduction of Christianity was gradually followed by the suppression of abortion and infanticide, at least as recognized customs. There was evolved a system of regulation which was wholly new in the history of the world. Laws, customs and social conditions combined to put such pressure on young people, especially among the poor, that marriage was delayed. Apart from postponement of marriage there was no other method in use of regulating the size of the family. Once married, people produced and brought up as many children as they could. It does not seem likely that such a system would be very effective in keeping fertility low. Such success as it had was due to the fact that disease was rampant in Europe in the Middle Ages, and the death-rate in consequence very high. Even in spite of this high death-rate it is probable that more often than not population was excessive. It may seem a strange thing to suggest that England was over-populated in the early part of the fourteenth century, when there were less than two and a half million inhabitants, or only about forty-five to the square mile. England would have seemed a very empty

country to us. But the desirable density depends upon the degree of skill and knowledge available, and it is probable that in the earlier part of the fourteenth century there were too many people rather than too few. That at least is the impression derived from the effects of the Black Death which took place about the middle of that century and carried off a third or thereabouts of the whole population of England. Since after the pestilence there was an increase in prosperity we are led to infer that there were previously too many people. We may sum up this period by saying that it was characterized by the abandonment of the ancient methods of regulation and the substitution of a new and less effective method. Had not elimination taken place on a larger scale than before, the new methods would probably not have been adequate to the situation.

During the eighteenth century Europe entered upon the latest phase in the history of the regulation of numbers. The hindrances which stood in the way of marriage gradually disappeared. Whereas formerly it was difficult for the employed classes to marry young, early marriage now became possible. Circumstances indeed encouraged it. Under the industrial system wage earners receive as much or nearly as much as they are ever likely to earn at, or soon after, the age of twenty. There is nothing to prevent them from marrying young, and as a rule they do so. During this period the average age for marriage has been the early twenties; it has not varied much and such variations as have occurred have had so little effect upon fertility that we may disregard them.

There are no figures showing the birth-rate for this country earlier than 1837. It is probable that the birth-rate was about 33 to 35 per 1,000 at the beginning of the nineteenth century. It is reasonable to suppose that the disappearance of the old hindrances to marriage had the effect of increasing the birth-

rate in the eighteenth century to some extent. But if it is true that the birth-rate stood round about 34 per 1,000 in 1800, then, as shown by the following table, which gives the birth-rate for England and Wales from 1841 onwards, there was no appreciable change during the first forty years of the last century. Whatever changes, therefore, the disappearance of the old system may have entailed, the effects were past before 1800. From that date to about 1875 the birth-rate was steady at about 35 per 1,000, after which it began to decline and has continued to decline ever since.

Period.	*Births per 1,000 living.*
1841–50	34·6
1851–5	33·9
1856–60	34·1
1861–5	35·1
1866–70	35·3
1871–5	35·5
1876–80	35·3
1881–5	33·5
1886–90	31·4
1891–5	30·5
1896–1900	29·3
1901–5	28·2
1906–10	26·3
1911–15	23·6

It is thus clear that the huge increase in the population of this country which took place during the last century was not due to a rise in the birth-rate. On the contrary the only notable change in the birth-rate was the decline which took place in the last quarter of the century. The increase in the population was thus due to a decline in the death-rate. There are no accurate records of the death-rate in the eighteenth century, but there is reason to think that it was in the neighbourhood of 30 per 1,000 in the earlier part of that century. It was probably over 25 per 1,000 in the early years of the nineteenth

century. The following table gives the figures from 1851 for England and Wales.

Period.	*Deaths per 1,000*
1851–5	22·7
1856–60	21·8
1861–5	22·6
1866–70	22·4
1871–5	20·0
1876–80	20·8
1881–5	19·4
1886–90	18·9
1891–5	18·7
1896–1900	17·7
1901–5	16·0
1906–10	14·7
1911–15	14·3

Putting together the estimates of the birth-rate and death-rate for the period before that to which the tables refer and comparing the tables for the later times, we arrive at the following conclusion: During the eighteenth century the birth-rate probably increased; in any case in 1800 it stood somewhere about 35 per 1,000; the death-rate certainly fell at the same time perhaps from somewhere about 30 to near 25 per 1,000. These are the changes which underly the very considerable increase of the population during the eighteenth century. During the first seventy-five years of the last century the death-rate alone changed. From 1875 onwards the birth-rate fell, but this fall was accompanied by a more rapid fall in the death-rate than had occurred before. Thus in spite of the falling birth-rate the population continued to increase. The table on page 41 illustrates the position.

There is no mystery about the fall in the death-rate. It was due to improved sanitary conditions and to advances in the study of medicine. If we go into details we can trace the effect of particular measures. If, for example, we study the infant mortality rate, that is to say the death-rate of children under

one year of age, we find that it fell during the earlier years of this century after the introduction of various measures promoting infant welfare. Changes in the birth-rate are not quite so easy to explain; the fall in the birth-rate since 1875 has in particular been often regarded as somewhat of a mystery. Up to 1875 the facts present no difficulties. The old-time restrictions of law or custom had faded away and men did not to any considerable extent impose restrictions upon themselves. Few, it is true, married as early as was possible, some did not marry at all, and others did not have as many children as they might have had. But it was in general a period of almost unrestricted multiplication, and as such an almost, if not quite, unique epoch in the history of the human race.

ENGLAND AND WALES

Inter-censal Period.	*Increase per cent. by births.*	*Decrease per cent. by deaths.*	*Gains per cent. by excess of births over deaths or natural increase.*	*Actual decennial increases per cent. of population.*
1861–71 .	37·56	23·98	13·58	13·21
1871–81 .	37·89	22·8[illegible]	15·09	14·36
1881–91 .	34·24	20·27	13·97	11·65
1891–1901 .	31·57	14·18	12·39	12·17
1901–11 .	28·56	16·13	12·43	11·89
1911–21 .	23·73	14·65	8·38	4·93

About 1875 the birth-rate began to decline. It has continued to decline ever since. Many explanations have been put forward. It has been supposed, for instance, that men have become less fecund. There is no evidence whatever for this suggestion. Nevertheless it is as well to remember that scientific knowledge of the effect of different conditions and different modes of life on fecundity is at present scanty. We are not in a position to say that changes in mode of life may not

have had some influence. At the same time this is not the only explanation we have to fall back upon. We know definitely that other factors have been at work, and it is not unreasonable to suppose that they may have been the whole cause of the decline in the birth-rate. Confidential inquiries have been made among married persons and from them we learn that many married couples deliberately limit the number of their children either by restricting intercourse or by the use of contraceptive methods. Deliberate restriction of the size of the family has thus played an important part in accounting for the decline of the birth-rate, and it may very well be the whole explanation. This conclusion is supported by the fact that the decline began among the better instructed classes of the community. These classes would be the first to learn new ideas and to adopt new habits. Had the cause of the decline been biological, it would probably have affected all classes alike.

It is interesting to notice that intensive propaganda in favour of birth-control coincided with the fall of the birth-rate. Earlier in the century such a propaganda had been set on foot. About 1820 Francis Place and some of the Utilitarian leaders were advocating birth-control. After a while this propaganda died down and for fifty years little was heard of it. Then in 1876 a bookseller was fined for selling a work which advocated these methods. Thereupon Mrs. Besant and Mr. Bradlaugh took the matter up, reprinted an edition of the book, took a shop, and openly exposed it for sale. A prosecution followed. The trial constituted a huge advertisement of the subject and concentrated public attention upon it. From that day propaganda in favour of birth-control has never ceased. In recent years it has been greatly intensified. While it is impossible to estimate the prevalence of contraceptive practices and of abstention from intercourse, it is probable that they account for the whole of the decline which the figures show.

A problem of absorbing interest now presents itself. How far was this unparalleled increase in population beneficial? Should we have been better or worse off if the population had not increased so rapidly? Did the growth of population in this remarkable manner correspond to the needs of the time? In order to simplify the problem we may for the present continue to regard the attainment of the highest possible average income as the only relevant method of judging whether the density of population actually reached was the most desirable.

We may think of this last phase as one in which the discovery of skilled processes and their application by man to industry went on far more swiftly than ever before in the history of the human race. The inventions affected manufacture far more than agriculture because manufacture offers far more opportunity to the inventor. Nevertheless great progress was made in agriculture; artificial manures were introduced, the rotation of crops was improved, and new implements such as the reaper and binder were invented.[1] The change in the situation was such that a considerable increase in population was desirable. Without a considerable increase the full benefit of these new skilled processes could not have been reaped. But had England remained a self-contained country, raising all or nearly all the food required, an increase in population would many years ago have ceased to be desirable. The increasing returns from manufacture which invention and a denser population have rendered possible would long ago have been more than set off by the decreasing returns in agriculture. The position was met by importing food in exchange for manufactured articles until now, as was brought home to us all during the war, we import from abroad a very large proportion of our food. Has

[1] Sixty years ago one man was required for every five acres of hay that were made; now there is required one man for every fifteen. There has been a 300 per cent. increase in the output per man.

the continuing increase in the population merely kept pace with, or has it exceeded, the requirements of the situation?

Sir Josiah Stamp has calculated that between 1800 and 1914, while the population increased about five times, the income of the country increased approximately ten times. When to this we add the fact that the purchasing power of money has about doubled, we may say that we were in 1914 about four times as well off as we were in 1800. Other calculations show that wealth has increased more quickly than population.

	Wealth of Great Britain. £		*Population.*
1865	6,133,000,000	1861	28,927,485
1875	8,548,000,000	1871	31,484,661
1885	10,037,000,000	1881	34,884,848
1895	10,663,000,000	1891	37,732,922
1905	13,036,000,000	1901	41,458,721
1909	13,986,000,000	1911	45,216,665

Real wages have increased, as the following figures show:

	Real wages.
1880	100
1881–5	105
1886–90	117
1891–5	125
1896–1900	132

How then are we to interpret these figures so far as they illustrate the position up to 1900? It is at least clear that there has not been so excessive an increase in population as to counterbalance all the advantages derivable from our progress in skill. It must be remembered that it is always possible to use the advantage that increased skill gives in either one of two ways. Increased skill makes a higher standard of living possible; alternatively it allows a considerably denser population to live at the same standard as before. Since the standard of living has markedly improved during this period, it is evident that the second alternative has not been adopted, at least in

its entirety. Some of the possible benefit has been taken out in better living. Has all the possible benefit been so taken out? Had the increase of population been less, would the increase in the standard of living have been greater? Was the density of population during this period usually at or about the desirable level? It is not possible to answer this question. All we can say is that in the opinion of some competent judges the increase in the standard of living might possibly have been greater had the increase in population been less rapid.

To illustrate the position after 1900 we may continue the table given on p. 44.

	Real wages.
1901–5	133
1906–10	134
1911	133
1912	132
1913	134

The steady rise in real wages visible since 1880 received a check in the opening years of the present century. The slow but steady improvement in the position of the working classes in this country which was a feature of the last century was no longer taking place in the decade before the war. And that decade was a period of unrest culminating in the great strikes of 1911–14. This unrest was in part due no doubt to other than purely economic causes. But it was also due to the relatively unfavourable economic position of the working classes. It is thus a matter of much importance to ascertain the reasons for this check.

Mr. Keynes has suggested that over-population was at least in part the cause. Population increased rapidly during these years. Improvements were made in industrial processes and some increase in population was probably justified. But may not the increase in population have been excessive?

The problem raised by Mr. Keynes is of the greatest com-

plexity. There are many causes other than over-population which might bring about these results. There is no simple method by which it is possible to isolate and measure the effects of a single factor in the situation, such as increase in population. The position is that the failure of real wages to rise over a period when increasing skill was being applied to industry and when population was growing is just the result that would follow if population had been growing too fast. But without a very elaborate analysis of the position, such as has not yet been made, we cannot say whether in fact this failure was due to excessive growth of population and not to other factors. Mr. Keynes has brought forward arguments to show that it was due to excessive population. Sir William Beveridge in an address to the British Association at Liverpool in September 1923 came to the conclusion that it was due to other factors. The discussion has been continued by these two authorities, and it does not appear that Mr. Keynes has succeeded in convincing other economists that his explanation is correct.

Nevertheless it must be allowed that as regards the interpretation of events before the war the possibility that population in this country was excessive cannot be altogether excluded. If this is so, then in trying to interpret the position to-day our attention must be turned to the question of population. The economic situation has in many ways been rendered less favourable by the war and, if it is true that population was tending to be excessive before the war, it is almost certainly excessive now. There is now in this country an amount of unemployment previously unparalleled. Real wages are on about the same level as in 1914. Is there any reason to attribute these facts to an excessive population?

It seems very natural to suppose that unemployment is a consequence of over-population. But this supposition does

not bear examination. If we examine the records of unemployment during the last century we find that there was never a time when there was no unemployment recorded. Between 1874 and 1900 the amount of unemployment among trade unionists fluctuated between 2 per cent. and 11 per cent. Now, as we have said, it may be that during this period there were rather more people in this country than were really required. It may be that, if there had been slightly fewer people, the average income would have been higher. But it is quite clear that population was not particularly excessive during the years when unemployment was high, and closely adjusted to the needs of the moment when unemployment was low. If population was excessive during these years, it was reflected in a decline in average income and not in unemployment. In fact unemployment is not the kind of result that over-population may be expected to produce. Unemployment is to be attributed to some failure of adjustment in the industrial system. Owing to causes which are not as clear as they might be, the industrial machine gets out of gear. A period of depression with unemployment follows. Gradually the machine gets to work again and unemployment diminishes, though even in the most prosperous times it never wholly disappears.

Very different results may be anticipated as the result of over-population. We should expect to see not unemployment but a lower standard of living than would otherwise be attained. In any country, given certain conditions and supposing no improvements to be made in methods of production, then, so long as no improvements were made, the optimum density would remain the same. If population increased under these conditions, then we should have a condition of over-population which would be reflected in a lower income per head and not in unemployment. In another country, in which improvements were being made in methods of production, the most desirable

number would be increasing year by year. Nevertheless, population might increase faster than was justified, and if it did so the result would be seen not in unemployment but in the failure of real wages to advance. This is in fact the position which Mr. Keynes has suggested was occupied by England before the war. It is supposed with good reason that countries like India and China are now over-populated, but we do not find, and do not expect to find, great unemployment there. We see a low standard of living—lower than might probably be obtained if there were fewer people.

That is why over-population is so insidious a danger. It does not produce obvious symptoms which call for remedies. The slow deterioration of the conditions of life is likely to give rise to a feeling of general dissatisfaction which may express itself in forms of action that only make matters worse. Men are likely to feel that they are not getting what they deserve ; they are working as hard as before and are receiving less. What then is the use of working so hard? If they so argue and in consequence work less, then the income per head will drop still farther.

How then should we regard the situation at the present time? In the first place the existing unemployment is not to be taken as evidence of over-population. On this subject there is no disagreement among economists. Unemployment is due to other causes. It is due in the main to the dislocation of the export trade of the world after the war. We are suffering from an unparalleled trade depression. There have been trade depressions before, but never one so severe. When conditions become normal we may expect to see the unemployed absorbed in industry. In the second place we must watch the standard of living. We must hope for a return to the conditions obtaining before 1900, when real wages were rising steadily year by year. If the standard of living does not improve, then we must

ask whether a too great increase of population is not, at least in part, the cause.

Provided that trade conditions become more normal, the present position in this country, with reference to the desirable density of population, is such as to demand very careful attention and investigation but not to cause serious anxiety. In it there are two important factors to be considered: the increase in population, and improvement in methods of production. It is impossible to foresee at all precisely how the situation will develop in either of these directions. With regard to population, a marked increase in the practice of birth-control is not unlikely, and would have profound consequences. If we make certain assumptions, however, it is possible to work out the size and composition of the population of Great Britain at various future dates, and such a calculation is very illuminating, though it must always be borne in mind that the assumptions made are not likely to be accurately realized. A very interesting calculation of this kind has recently been made by Professor Bowley.

The professor takes as his starting point the population of Great Britain in 1921. He points out that owing to various causes the composition of the population was peculiar. Owing to the decrease in the birth-rate during the war the section of the population under 5 years of age was relatively small. The section over 65 years of age was also relatively small because those who composed it were the survivors of a generation born when the total population was little more than half its present size. Now these two sections of the population, the youngest and the oldest, are those whose mortality is always highest. As they were deficient, it follows that the death-rate was abnormally low. In this manner arose the phenomenon peculiar to 1921—the combination of a considerable natural increase with a diminishing number of births. These underlying facts are as a general rule wholly neglected, and the

resulting natural increase taken at its face value without further inquiry. It is usually assumed that unless there is some drastic reductions in the birth-rate this considerable annual increase must continue.

That there is no foundation for this common opinion has been shown by Professor Bowley. Starting with the 1921 population, he has calculated what the population of Great Britain will be at certain future dates, on the hypothesis that the annual number of births is the same as in 1921–3, and that the death-rates are as in 1910–12, and that there is no migration. His results are given in the following table.

THE POPULATION OF GREAT BRITAIN[1]

THOUSANDS

Ages.	*1921.*	*1931.*	*1941.*	*1951.*	*1971.*	*1991.*	*2011.*
			Males.				
0–15 . .	6,011	5,666	5,788	5,788	5,788	5,788	5,788
15–45 . .	9,358	10,241	10,690	10,726	10,564	10,564	10,564
45–65 . .	3,949	4,463	4,538	4,954	5,381	5,389	5,389
65– . .	1,103	1,386	1,737	1,862	2,110	2,191	2,223
Total . .	20,421	21,756	22,753	23,330	23,843	23,932	23,964
15–65 . .	13,307	14,704	15,228	15,680	15,945	15,953	15,953
			Females.				
0–15 . .	5,929	5,585	5,713	5,713	5,713	5,713	5,713
15–45 . .	10,657	11,125	10,974	10,683	10,515	10,515	10,515
45–65 . .	4,279	5,125	5,595	5,949	5,797	5,676	5,676
65– . .	1,480	1,790	2,247	2,602	2,991	2,860	2,836
Total . .	22,345	23,625	24,529	24,947	25,016	24,764	24,740
15–65 . .	14,936	16,250	16,569	16,632	16,312	16,191	16,191
20–45 . .	8,643	9,182	9,138	8,847	8,679	8,679	8,679
Total M. & F.	42,766	45,381	47,282	48,277	48,859	48,696	48,704
			Percentages.				
0–15 M. & F.	28	25	24½	24	23½	23½	23½
15–65 M. .	31	32	32	32½	32½	32¾	32¾
15–65 F.. .	35	36	35	34½	33½	33½	33½
65– M. & F.	6	7	8½	9	10½	10½	10½

[1] Bowley, *Economic Journal*, vol. 34, p. 189.

Given these assumptions, therefore, the growth of the total population of Great Britain, which was 10 per cent. from 1901 to 1911, and 4·7 per cent. from 1911 to 1921, would be 6 per cent. from 1921 to 1931, about 4 per cent. from 1931 to 1941, and a little over 2 per cent. from 1941 to 1951; then there would be a very slight increase to a maximum about 1971, followed by a slight fall. At the same time the age composition of the population would change. The younger people would form a smaller and the older a larger proportion of the population, while those of working age would form about the same proportion as now. The result of these calculations is quite unexpected by most people, and it may therefore be pointed out that the net result of the probable changes in the birth-rate and the death-rate are more likely to result in a reduction than in an increase of the population at the various dates in the table. In other words the assumptions upon which the table is prepared tend to exaggerate the probable increases in population.

Let us now turn to the other side of the medal and ask what prospects there are of increasing the productivity of labour. During the last hundred years the large increase of population was in itself of great benefit in that it made possible minute division of labour and great economies in distribution. These developments, however, have gone as far as they are likely to go. We must look rather to improvements in the organization of industry and to the progress of scientific discovery. The organization of industry—in the direction not of division of labour but of attention to its human needs—is yet in its infancy. It is surely a remarkable fact that in a modern industrial establishment we find experts in costing, accounting, and the numerous technical processes, but few or none in the most difficult and technical branch—the management of labour. There is very little technical education either in schools or through an apprenticeship system; a beginning has hardly yet

been made in vocational guidance ; there is a vast amount of friction and waste involved in short-time engagements. In fact the system so works that the worst rather than the best is made of the human material. There can be no doubt that a careful organization under trained supervisors, leading to more rational and more humane treatment of the workpeople, would lead also to a very large increase in productivity.

It is a favourite pastime of some people to speculate upon the probable course of scientific discovery. Such speculation has its uses, but for our purposes it is not a very profitable occupation ; it is too indefinite. The power of man over nature may, in the near future, be increased by scientific discovery to an almost unimaginable extent. On the other hand, nothing dramatic may happen. There are no sure grounds for anticipating when or in what direction discoveries will be made. Nevertheless a few remarks may not be out of place.

Scientific discovery will continue. There are as good grounds for this prophecy as for any that can be made. Scientific thought and method have gained so wide a hold and have struck such deep roots that the forces of ignorance and prejudice, which more than once in the history of the human race have seemed to negative them, can never prevail again. We may take it as certain that our power over nature will increase.

In the last century the contribution of science took the form of the application of discoveries in physics, chemistry, and allied non-biological sciences to industry and agriculture. Discoveries in these branches of science are still being made at least as rapidly as at any time in the last century. But of late they have not been of the same importance as before in adding to our production of food, clothing, and other necessaries. Aeroplanes, submarines, and broadcasting are great achievements of applied science, but they are of little assistance in raising the standard of living. We should like to know whether

it is mere chance that of recent years science has been stimulating our faculty of wonder rather than ministering to our needs. It would seem that unusually favourable circumstances in the earlier part of the last century made it possible for science to render more assistance than it is likely to do again within so short a period. It was in those years that we secured the greater part of that fourfold increase in wealth which, as noticed above, occurred between 1800 and 1914. On the other hand, it is probably a mere matter of chance that productive discoveries have latterly been somewhat rare. A cautious forecast might well anticipate more help to agriculture and industry in the next fifty years than in the last.

Progress in biological science has as yet done little for agriculture. Mechanical inventions did more for agriculture in the last century than biological discoveries. This was not because biologists were less active than physicists and chemists, but because biologists are presented with more abundant material, and, in a sense, with a more difficult task. Hitherto biologists have been occupied in classifying and describing their material. They are now turning to experiment; discoveries of great practical importance have already been made. The first steps are being taken towards an understanding of how to control the production and growth of animals and plants. New and better varieties of wheat are now on the market which have been produced—to meet the requirements of the farmers—by the application of our knowledge of heredity. Great advance is to be expected on these lines, and even greater progress can be anticipated as our knowledge of the factors influencing the growth of animals and plants increases. The entry of experimental biology into this field and the continued progress of the non-biological sciences allow the most cautious speculator to anticipate a very considerable increase in the productivity of labour in the near future.

During the last five years there has been much discussion of the population problem as it affects this country. Many of the debaters have been inclined to take a somewhat pessimistic view. The discussion is to be welcomed; only too often the fundamental conditions upon which our civilization rests are left wholly out of account. But to what conclusion does our review of the position lead? It would appear that the huge increase of population in this country during the last century did not result in any serious degree of over-population, if indeed there was over-population at all. Looking to the future we find the tide so set as to lead us to anticipate within a few decades a population stationary at a density not greatly in excess of the existing density. At the same time there is every reason to expect that scientific progress will render labour increasingly productive. The outlook is therefore not unhopeful. Those who are inclined towards a pessimistic view are generally influenced by a study of pre-war and contemporary conditions. While it may be that between 1900 and the present day certain facts suggest over-population, there may be other explanations. And when we enlarge our view and take into consideration the last century and the probable course of events during the next fifty years, then it would seem that, even if the position is now and has been for some time not altogether favourable, it is only a temporary depression.

6

It will be useful at this point to look back over the ground that we have traversed. At the outset it was evident that any consideration of the problem of population would lead us to examine many different questions. Attention, however, is almost inevitably drawn to one question in particular—that of increase of population. It is, of all the various questions raised,

that which has the most immediate interest. Furthermore, an inquiry into this aspect brings us to the root of the whole matter.

Investigation shows that while the power of multiplication may differ somewhat from race to race, and within the same race at different periods of its history, it is nevertheless always almost unimaginably vast. The descendants of a single couple whose multiplication was unrestricted could theoretically in a relatively short space of time amount to many millions. But though they might theoretically be able to increase to this extent, they could never do so in practice because the food supply would be insufficient. Therefore we must distinguish between the theoretically and the actually possible increase. We must further distinguish between the increase that is possible and the increase that is desirable. It is always possible for the population to increase up to the point at which all the members will just not starve. But it is never desirable that it should do so. It is desirable that population should increase up to and no further than the point at which the average income is the largest obtainable. The population that is desirable from this point of view always falls very far short of the population that is possible. Further, the density of population that is desirable as a general rule increases with the increase of knowledge and skill. It follows that if knowledge and skill remain the same for any period, then for that period the desirable number remains the same.

Now the knowledge of skilled processes has, if we take a long view of human history, increased very slowly. In early times it remained the same over long periods of time. In these times the desirable density remained the same. Only within relatively recent times has our technique advanced at all rapidly, and so it is only recently that a much denser population has become desirable. This being so, we inquired what had been

happening in the history of the human race and we found that there was little evidence of the population increasing at any time up to the actually possible limit. The explanation of this seems to be that if population did so increase then all the benefits which might accrue from a knowledge of skilled processes would be missed. Any group of people, therefore, which practised customs leading to a limitation of numbers to the desirable density would be at a great advantage compared with other people. The practice of such customs is in fact essential for material progress and we may reasonably suppose that there has been a ' natural selection ' of groups practising these customs.

The evidence, therefore, is that throughout the greater part of human history the power of multiplication has been held back in such a way that population has not increased to the actually possible limit. How nearly at different times it has approximated to the desirable density it is impossible to say, though the fact that great benefits are to be derived from this position must have placed groups arriving at and maintaining it at a commanding advantage. Further inquiry shows what methods have been employed to limit the power of multiplication—infanticide, abortion, and restriction of intercourse—universally from the earliest times up to the present day except in Europe. In Europe these methods gave way early in the Christian era to a system of postponement of marriage which was only effective because of the very high death-rate. Latterly there has been no enforced postponement of marriage and in its place has grown up a system of voluntary family limitation.

We have now arrived at a point where we can see the group of problems connected with the birth-control controversy in its proper perspective. Leaving aside for the moment the methods of limiting population proposed by those who advocate

birth-control, it should be noted that it is the regulation of the power of multiplication which is aimed at. Now our argument has led us to see that regulation of numbers has always been, is now, and will always be an absolute necessity. If numbers are not regulated, the population will increase to the actually possible limit, until the average income will just keep men from death by starvation. The whole population will exist in a half-starved condition and further increase will be checked by actual starvation. Limitation is, therefore, always necessary. If there is over-population, then more limitation is required; if under-population, then rather less limitation. Under no circumstances should limitation be absent. And it should further be realized that the need for limitation is no new thing. It is not that we have now arrived at a time when this necessity is forced upon us. The necessity has always been there. It appears to us to be a new thing for two reasons. First, limitation has hitherto been forced upon men by the pressure of custom and convention, and the practical effect of these customs and conventions was seldom fully realized by those who obeyed them; men formerly limited numbers often without any clear realization of what they were doing. Secondly, we have just passed through a period which has had no parallel in history and is never likely again to be repeated. Owing to the sudden application of new skilled processes to industry, and other unusually favourable circumstances, what amounted to almost unrestricted increase was for a few years more nearly justifiable than it ever was before or very probably will ever be again.

Man is engaged upon the task of subduing his surroundings and of becoming, so far as is possible for a being of limited powers, the master of his own destiny. He set out upon this task many thousands of years ago and the first necessary step was the elaboration of a method of limiting the power of

increase. Hitherto this end has been achieved by man without full consciousness of what he was doing. He has now learnt something of his own mental and physical characteristics and of the conditions under which his life is lived. He can see the necessity for the limitation of numbers as he never saw it before. At the same time he will no longer practise the old methods of infanticide and abortion, which have become revolting to him, and will no longer accept the tyranny of custom and convention which forced upon him postponement of marriage and prolonged abstention from intercourse. Whatever methods he adopts in future, they must be such as he will voluntarily accept.

The regulation of numbers is thus, when seen in its due perspective, a task which man cannot neglect unless he is prepared to give up the attempt to master his surroundings. What methods are open to him? There is postponement of marriage. If this were the only method, then marriage would have to be very considerably postponed. To such prolonged delay there are many obvious objections. To mention only two; such a system would inevitably lead to irregular sexual habits on a large scale, and children would suffer inasmuch as younger parents are on the whole better fitted to care for them than are the middle-aged.

We are thus left with 'birth-control', using that term in the wider sense to include two very different things, namely, abstention from intercourse between married people and the use of contraceptive methods. The controversy about 'birth-control' is familiar to every one to-day and it is not proposed to enter upon it here. The object of this book is to deal merely with the main aspects of the population problem. Limitation is necessary; it is only a question of choosing between different possible methods. But we may allude to certain facts. Those who object to 'birth-control' by any particular method ought

to realize that some method of achieving the same result is necessary. Only too often they speak as though no limitation of numbers by any method was required. There is no excuse for this attitude. If they object to any particular method they should be prepared to recommend some other method. It may be a choice of evils, but the choice must be made.

Of the two methods included under the term 'birth-control', the first—abstention from intercourse—apparently meets with no objection from religious or moral motives. The objections to it are that it may have certain psychologically injurious results. The second method—the use of contraceptives—does meet with strong religious and moral objections. We cannot deal with them here. It also meets with what may be called aesthetic objections. On this point it should be borne in mind that methods will no doubt before long be invented which are less crude and thus less open to objection on these grounds. Recent biological work leads us to expect that methods of inducing temporary or permanent sterility may be found which will be no more objectionable than taking medicine.

As has been sufficiently explained, methods whereby numbers are limited are and will always be necessary. But there are certain methods, those for instance included under the term 'birth-control', which may be advocated for additional reasons. By the use of these methods a great amount of suffering and waste of life may be avoided. When these methods are not employed, a married woman usually bears children in rapid succession and often incurs a great and undue strain. Her health may suffer; in any case she is usually unable to take proper care of her children and the mortality among them is high. The infant mortality-rate per 1,000 births gives us a measure of this waste of life and suffering. Now we find that the rate

has lately decreased in this country, as the following figures show :

ENGLAND AND WALES

Period.	*Infant mortality-rate.*
1896–1900	156
1901–5	138
1906–10	117
1911–15	110

The fact that the birth-rate began to decline about 1875 whereas the infant mortality-rate did not decline until about 1900 shows that the relationship between child mortality and fertility is not as close as is sometimes suggested.

Dr. Stevenson, who has made a study of the matter, has come to the conclusion that the decline in infant mortality is in considerable measure due to the decline in the birth-rate. But, as we have seen, the decline in the birth-rate is to be attributed to deliberate family limitation by one or other of the methods known together as ' birth-control ', and thus there are grounds for asserting that birth-control has done something and can do more to alleviate the suffering and misery arising from a rapid sequence of childbirths. Looking into the matter rather more closely, what appears to happen is this. There is a close connexion between the number of children who die and the rapidity of births. A large number of children die because a large number are born rapidly one after another. At the same time a large number of children are born because a large number die. They are called into existence to fill the vacant places. There is thus a vicious circle which nothing can break except the employment of methods which will limit the number born by spacing out the interval between births.

The huge amount of avoidable suffering which a high birth-rate usually entails can be well seen when we compare the vital statistics of different countries. We find that a high

birth-rate and a high death-rate may result in the same or even a smaller survival-rate than a low birth-rate and a low death-rate. The following figures illustrate the conditions in different countries :

Year.	*Birth-rate.*	*Death-rate.*	*Survival-rate.*
England and Wales			
1910	25	13	12
1911	24	14·5	9·5
1912	24	13	11
1913	24	14	10
1914	24	14	10
British India			
1910	40	33	7
1911	39	32	7
1912	39	30	9
1913	39	29	10
1914	40	30	10

During these five years the survival-rate has been on the whole greater in England and Wales than in British India in spite of the birth-rate being much higher in the latter than in the former country. The amount of misery directly due to the conditions prevalent in the latter country is unmeasurable. On these grounds alone, therefore, there is a very good case for some kind of birth-control, quite apart from its function in limiting numbers. It is possible to have the same survival-rate in two countries, one with a large birth-rate and a large death-rate and all the inevitable physical and mental suffering entailed by such conditions, and the other with a much lower birth-rate and a much lower death-rate and a consequent reduction of suffering.

Two words of caution are here necessary. First, we must not forget that there is no very close and definite connexion between fertility and infant mortality. Secondly, such figures as those given in the last table cannot be taken at their face value without further inquiry. The death-rate, for instance,

is the number of deaths occurring among 1,000 of the population in a year. But many more deaths will occur in a year among old than among younger people, and therefore, if one country has more old people than another, the death-rate will be higher in the former country even though the conditions are equally healthy.

These two points are illustrated by a comparison of English and French statistics. In 1923, to which year the following table refers, the population of England and Wales was about 38,403,000 and of France about 39,210,000.

	Births.	*Deaths.*	*Deaths of infants under one year.*	*Natural increase.*
France . . .	761,861	666,990	73,283	94,871
England and Wales .	758,386	444,869	52,362	313,517

With regard to the first point the figures show that, although the birth-rate was not dissimilar for the two countries, the infant mortality-rate was far higher in France than in England. Now, since the infant mortality-rate gives the number of children who die in a year per 1,000 registered births, the infant mortality-rates of the two countries are, therefore, directly comparable, and the difference between them must be due to differences in the amount of care and attention given to problems of child welfare. It is clearly not due to any difference in the birth-rate. The second point is illustrated by the huge difference in the number of deaths. As we saw above, in one country there may be in every 1,000 of the population many more old people than in another. In 1911 those over 65 years old constituted over 8 per cent. of the population of France, while in England they constituted less than 6 per cent. Therefore the death-rates are not comparable and to a very considerable extent the difference between them is due to the difference in the age distribution of the two populations. Until correc-

tions have been made in the figures to allow for the differences in age distribution, we cannot draw any conclusion as to the relative healthiness of the two countries.

The practice of family limitation is thus one of the methods whereby the power of multiplication may be held in check. Incidentally it has certain advantages over some other methods in that by its use suffering and waste of life may be diminished. The question now arises whether it is a method that can be easily adjusted to the needs of the time. It is probable that the methods in use in past times were more often ineffective than too successful in limiting numbers. The system of postponement of marriage in the Middle Ages was, for instance, probably a somewhat ineffective method; there have been, however, instances in which the method employed has been too effective. Some South Sea Islanders, for example, committed infanticide on so huge a scale as to be in danger of extinction. Methods must be judged, among other characteristics which they possess, by the ease with which they can be adapted to a changing situation. In order that we may judge of this aspect of family limitation, let us look into the conditions under which it is practised to-day.

In the earlier part of the last century there was but little conscious limitation of the size of the family. In the latter part of the century the practice of limitation set in and has spread more and more widely through society. In what circumstances and for what reasons did people then, and do people now, in the main limit their families? The matter is very obscure. In marked contrast to conditions prevailing in Asiatic countries, Englishmen are bent upon maintaining and improving their standard of living and what appears to happen is something of this kind. Supposing that a married man's income remains the same over a period of years and that during this time prices rise, his real income will decrease. In his

struggle to maintain his real income he may decide to have fewer children and thus reduce his expenses. Or, on the other hand, prices may fall. Under these latter conditions he may decide either to have more children and thus to remain at the old standard of living or to have the same number and rise to a rather higher standard. It seems that men in general, when faced with these alternatives, now tend so to regulate their families as to maintain or improve their standard of living.

If this is a correct reading of the circumstances under which men practice family limitation, then the situation is not unsatisfactory. If men individually are striving to attain the highest standard of living that is open to them, then the density of the population as a whole will approximate to the desirable density. But, it may be suggested, does not modern social legislation counteract this tendency? If we provide for the children of poor parents milk free or below cost price, day nurseries, infant clinics, free meals when at school, are we not trying to raise the standard of living for them, and in so doing are we not weakening the motive to practise family limitation? The answer is that those who are helped in this fashion have not yet begun to practise it on any considerable scale. There is, therefore, no question of discouraging a practice which already exists. But now a different question arises. What effect have these measures upon the adoption of the practice? Now one of the reasons why poor people do not limit their families is that their standard of living is very low. There is nothing to maintain. To a certain extent, therefore, the effect of these measures of assistance will be to raise them to a position worth maintaining; and the practice of family limitation may thus be expected to follow as a result. It is not meant that every form of assistance would have this effect; but we may conclude that, generally speaking, modern social legisla-

tion, so far as it has yet gone in that direction, has tended to encourage the limitation of the family.

The same considerations apply to schemes of 'family endowment'. Such schemes are now at work in France, Germany, and other countries. They take various forms; in its usual shape 'family endowment' may be described as the pooling of the wages now paid in any business and their redistribution with reference to the family circumstances of the wage-earner. Thus the system does not affect the employer, who pays the same total amount in wages as before, but the employees receive more in proportion to the number of their children. There are those who advocate the adoption of the system in this country on the grounds that the married man with children requires a larger income than the bachelor. We are not concerned here with the merits of the system from this point of view. Mention of it is relevant because it is often held that its adoption would increase the birth-rate. It is argued that higher wages for those with larger families would encourage the bringing into the world of more children. Family endowment has in fact been advocated in France as a method of increasing the population. The system has not been long enough at work in France to allow of any conclusions being drawn, but it is perhaps worthy of notice that the births in France in the first quarter of 1924 were less than those in the first quarter of 1923. On general grounds we may expect a result which is the exact opposite of that hoped for in France and feared in this country. We may anticipate that the raising of the standard of living of those most hardly pressed will result in an effort to maintain that standard by the adoption of the practice of family limitation.

There is another feature of modern civilization which tends towards the acceptance of the principle of family limitation. The raising of the status of women has been one of the chief

characteristics of recent social evolution. Women have become better educated and more independent; their position has in every respect become more dignified. Observation seems to show that where this change has been most marked, there the principle of family limitation has been most readily accepted. Compare, for example, the position of women in those districts where the cotton industry is predominant with districts where mining is the only industry. In the former, where many women are employed, their status is distinctly superior to what it is in the latter, where there is little or no opportunity for women to gain an independent position. And we find the birth-rate to be far higher in the latter than in the former. So too if we compare not one district with another but one class with another, we find that it is among middle-class people, where the improvement in the position of women has been chiefly noticeable, that the decline in the birth-rate has been most marked. There can be little doubt in fact that the increasing dignity of the position of women in society is a factor leading to the acceptance of the principle of family limitation.

Family limitation therefore is a method of checking multiplication which has in this country up to the present been used in the direction of adjusting numbers to the desirable density. Taking the country as a whole, the check to multiplication is sufficient, though it may be too great in some classes and too little in others. A more equal practice of the method throughout the different social classes is very desirable, but that is rather a different matter. The important point for our present purpose is that the method is showing itself to be sufficiently effective. There may be some danger that families will be too severely limited in the future. But that danger is not inherent in this particular method. Those communities who practice infanticide have not as a general rule abused that method; but there are instances of its excessive practice to the point at which

the race is threatened with extinction. If at any period owing to selfish or other motives men refuse to play their part in rearing children to take their place when they die, the root of the evil is to be sought, not in the particular method of checking multiplication which they abuse, but in some decline in moral standards. And if the method of family limitation becomes widely abused in the future, as it is possibly abused to-day among a small section of the community, it is in such deterioration that the cause will have to be sought.

7

Our inquiry into the conditions underlying the increase of population has given us certain conclusions which form a guide to the numerous other problems of population which exercise men's minds at the present day. We have already spoken of the problem of birth-control, and with these conclusions in mind we have been enabled to see what place the birth-control controversy occupies in the population question as a whole. Many other problems suggest themselves for discussion and perhaps the one which claims attention first is that of the future population of the world.

There are aspects of this question which are of the utmost importance. It may be that the increase in the density of population beyond a certain point will render healthy social life impossible. It is possible that, while the crowding of people together might bring good results as far as the production of wealth was concerned, these good results might be more than counterbalanced by the evils which overcrowding would cause in other aspects of life. This is a matter which we shall touch upon later. Again, the increase in the population of different countries at different rates may be the cause of conflict and rivalry, and this also is a subject we shall have to refer to. But

there is another aspect of the matter which often causes anxiety, especially at the present day. It is said that the population of the world is increasing; that the time is approaching when the whole of the food-producing area of the world will be cultivated; and that the inhabitants of the world are thus in measurable distance of an inevitable shortage of food.

Let us look at the argument rather more closely. The population of the world is now about 1,700 millions. It has about doubled in the course of the last century. This is equivalent to a continuous rate of increase of about 0·7 per cent. At present the rate of increase is about 1·16 per cent. If we suppose that the population continues to increase at an average rate of 1 per cent., then in round numbers the population at successive fifty-year intervals would be as follows, expressed in millions:

Years	0	50	100	150	200
Population	1,700	2,796	4,598	7,562	12,437

Years	250	300	350	400	450	500
Population	20,455	33,640	55,326	90,991	149,647	246,114

In other words the population of the world is now about 33 to the square mile; it will in 500 years be nearly 5,000 to the square mile if the present rate of increase is maintained. These figures exclude the polar regions, and on the same basis we may say that the land area of the world is about 33,000 million acres. But taking 40 per cent. as the proportion of the land area which is capable of cultivation we reduce the figure to 13,000 million acres. From this 13,000 million acres the food supply of the world has to be raised. Making the rather generous estimate that on the average one person can be supplied from each 2·5 acres of these 13,000 million acres, we arrive at the conclusion that a population of 5,200 millions and no more can be supported. But this total will be reached in rather more than 100 years if things go on as at present. Is not, therefore,

the prospect somewhat black? It is not a matter concerning a very remote future only. It will concern our grandsons.

To some of those who have discussed the matter the outlook seems nearly hopeless. The eminent statistician whose figures have just been quoted goes on to speak as follows: 'No artifices of cultivation, nor any possible diminution of human stature, so as to decrease the necessary quantity of food per person, can possibly relieve the gravity of the situation. In no way can the increase of 1 per cent. per annum be maintained for five centuries. Nor could any hoarding of resources materially affect the question.'[1] The prospect must indeed be desperate if we are driven to consider the possibility of the effect which a decrease in the size of the human body and therefore of its need of food would have upon the situation. It is not often, it is true, that such extreme remedies as these are suggested, if only to be condemned, but nevertheless anxiety is so often expressed nowadays upon this score that we may inquire what foundation there is for it.

It is here that our historical discussion will help us to see this problem in its true proportion. Those who thus look at the matter seem to regard the increase of population as inevitable. Though they may not say so in so many words, they seem to suggest that population always has been increasing and will always go on increasing until it produces a catastrophe which now appears to be approaching. They forget that, although the power of multiplication has always been very great, population has in fact during the greater part of the history of the human race been stationary. Periods of increasing population, when the increase was rapid enough to be observable by those living, have been rare if we take a long view of history. A continuing increase of population is therefore not inevitable. Analysing the factors underlying the growth of population,

[1] Knibbs, *Scientia*, vol. xii, p. 495.

we distinguished between the theoretically possible increase, the actually possible increase, and the desirable increase. With these conceptions in mind we reviewed the historical facts and found reason to believe that the growth of population had, as a general rule, stopped short of the actually possible increase, and had thus to some extent approximated towards the desirable density. We saw that peoples in different places and at different stages of social evolution had elaborated means of limiting increase in such a fashion as to approach this end. And since as a general rule knowledge of methods of production was at a standstill, it was desirable that the density of population should remain the same. When new methods of production were being rapidly invented, as happened in the last century, a rapidly increasing population was justified. But the peculiar features of the last century must not mislead us. Increase is not inevitable, and history gives us reason to hope that it may be limited in the future to the needs of the situation, and even, if necessary, checked altogether, as it has been in the past.

It is thus a mistake to think of population as increasing from the dawn of history until the cultivable area of the world is fully used. The truth is that at any stage in history a catastrophe is possible if the population is allowed to increase unchecked. It would be a catastrophe for a hunting race, living under conditions which allowed a hunting population of one per acre, to increase to a population of two per acre. It would be a catastrophe for an agricultural race for whose conditions the desirable density was twenty per acre to increase to a density of forty per acre. Similarly it would be a catastrophe if the population of the world continued for long to increase at its present rate, unless means of increasing production were found by which in some manner, difficult perhaps for us to imagine, the point at which decreasing returns set in was very considerably pushed back. But history gives us reasons for hoping that such a catastrophe will not occur. Means of limiting population

have been found at all stages of history in the past and there are grounds for expecting that conscious methods, which are the only methods tolerable to civilized nations, will achieve the same result in the future. The essential thing is that nations should strive to reach and maintain the highest standard of living within reach and that they should be prepared to limit their families in order to achieve this end. If they do this, then not only will the catastrophe foreseen by some writers not come about, but material prosperity may with the progress of scientific inventions be expected to increase.

To these gloomy prophets there is thus a sufficient answer. They exaggerate the prospective growth of population. Sir Henry Rew has recently pointed out that there is also a tendency to underestimate the food resources of the world. In 1898 Sir William Crookes in an address to the British Association announced that the possible limit of wheat cultivation had been reached and that increased supplies could only be obtained by more intensive agriculture. But figures published by the Board of Agriculture referring to the British Empire, Europe, and certain other countries comprising the United States, Argentine, Japan, Siberia, and Algeria, show that between 1901 and 1911 the total wheat area in those countries increased from 200,930,000 acres to 247,000,000 acres —an increase of 23 per cent. As Sir Henry Rew says, it is a warning to prophets.

Mere blind complacency with regard to this problem is the attitude which it is least desirable to encourage. It needs the most intense investigation and the most careful thought. But, on the other hand, gloomy forecasts are to be deprecated. Not only are they usually founded on an inadequate or even erroneous appreciation of the situation, but they tend to encourage a fatalistic attitude. Nothing is more certain than the fact that it lies within the power of the human race to dictate its own future in this matter.

This train of thought leads us to consider certain difficulties which arise from the fact that the total population and the rate of increase of different countries vary very greatly. These difficulties, it is important to observe, may exist when there is no question of over-population in the true sense of the word. They may also arise owing to a failure of population to adjust itself to the desirable density. The latter kind of difficulty is at least in theory avoidable, whereas the former is not. It is therefore convenient to consider them separately, and we may begin with the first kind of difficulty—that which is inevitable.

Let us take a brief glance at the position in which different countries find themselves at the present day. There are those which have for a long time been settled. All European and most Asiatic countries are in this position. It is the result of a series of what we can only regard as historical accidents which took place long ago. Large areas became divided into countries of very different sizes, each owning allegiance to a different state authority. Each country possesses institutions and elements of civilization peculiar to itself. In Europe, and to much less extent in Asia, there has developed in each country a spirit of nationalism based ultimately upon the consciousness of those who inhabit the different countries and who share certain elements of civilization which dwellers in other countries do not possess.

Now the countries of Western Europe may be regarded as being in about the same degree of industrial development. They are all about equally well equipped, so far as knowledge goes, with command over nature. But owing to this series of historical accidents they possess territories of very varying sizes. Therefore even if these territories were equally fertile and equally productive of minerals and in other ways equally

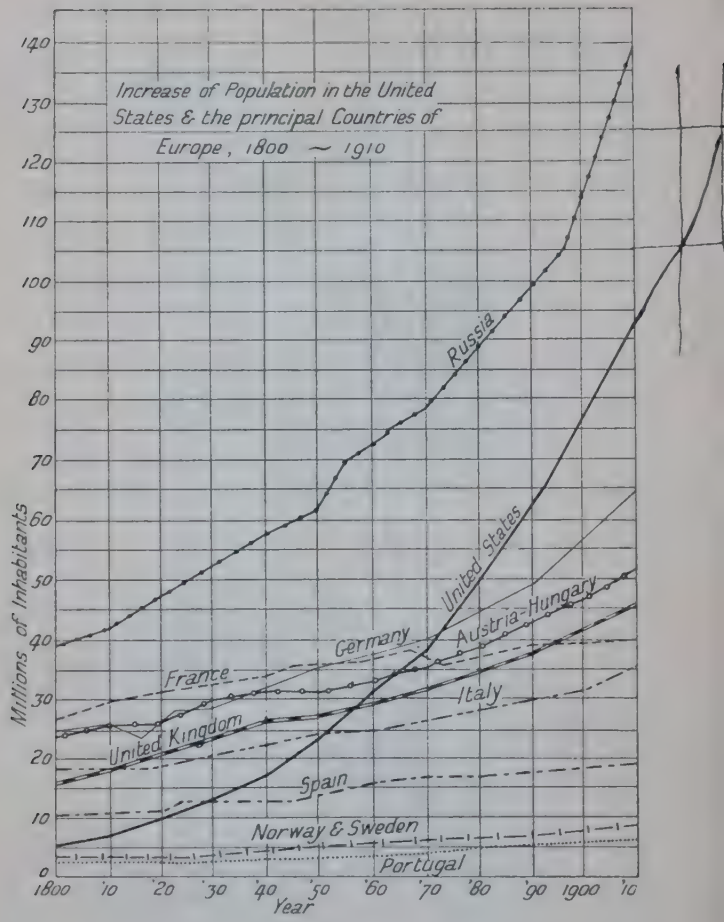
valuable, the differences in size would create a difficulty in that the desirable number of inhabitants owning allegiance to different states would vary greatly. But they are not equally valuable for all stages of industrial development. The area of Norway is more than twice as large as that of England and Wales together. But Norway is poor in coal and in minerals, and the knowledge and skill gained during the last century, which has justified great increases in the population of other countries richer in these respects, has justified relatively little increase in Norway. For the same reasons industrial progress during the last century justified a large increase in the population of England and Wales, but not in the population of Ireland. Further difficulties arise from the fact that all settled countries are not in the same stage of industrial development. We have only to pass from Western Europe into Russia to find ourselves in a country which is naturally rich but to which the knowledge and skill available in Western Europe are only beginning to be applied. But as the application of these methods is made in Russia a far greater rate of increase of population will be justified in Russia than in the more fully developed European countries. The population of Russia could for many years under such circumstances justifiably increase much as the population of England grew in the last century. Those countries, therefore, which have much leeway to make up in their use of skilled methods already in existence are in a favourable position in the sense that they can increase their population far more rapidly than other countries who, before an increase can be justified, have to wait upon new discoveries.

Before we look more closely into the nature of the difficulties so caused, we may notice that there are countries in which settlement is recent and the process not yet complete. America and Australia are examples of countries in this position. In these two countries the application of known skilled processes

is made in the fullest possible degree. They are not, like Russia, in a favourable position in that they have leeway to make up on this account, but they are favoured in that their territory is not fully occupied. Therefore, as in Russia, though for different reasons, a greater rate of increase of population is justified than is the case in Western European countries.

The map on p. 75[1] and the diagram on p. 76[2] will help to make the position more clear. The map illustrates the different rates of increase which obtain in different parts of the world at the present time. We see that a natural rate of increase of twelve or more per thousand is found in countries which fall into two groups. There is first the group of not yet fully settled countries, America, South Africa, Australia, and New Zealand, and there is, secondly, the group of countries which are engaged in making up for lost time in the application of skilled processes to industry. This latter group includes Eastern European countries and Japan. The diagram is more illuminating. It shows the increase of population in the United States and the principal countries of Europe from 1800 to 1910. Two facts stand out. One is the rapid increase of the population of Russia and the other the rapid increase in the population of the United States, showing the advantage which both recently settled and undeveloped countries have had during this period. The United States, starting in 1800 with a population greater only than that of Portugal and of Norway and Sweden among the countries for which details are given, had by 1875 come to have a population greater than that of any European country except Russia. The diagram also brings out the fact that France, starting with a population greater than that of any European country except Russia, has been caught up and passed by Germany, the United States, Austria Hungary, and the United Kingdom in succession. In the following table the

[1] East, *Mankind at the Cross-roads*, p. 81. [2] East, loc. cit., p. 76.


Increase of Population in the United States & the principal Countries of Europe, 1800 ~ 1910
Millions of Inhabitants
Year
Russia
United States
Austria-Hungary
Germany
France
Italy
United Kingdom
Spain
Norway & Sweden
Portugal
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
1800
'10
'20
'30
'40
'50
'60
'70
'80
'90
1900
'10

changes in the proportion which each European country contributed to the total population of Europe from 1880 to 1910 are illustrated.[1] The decline of France and the advance of Russia during this period are well brought out.

Of the Total Population of Europe (= 100) the Proportion in Each Country in the Year

	1880	*1910*
England and Wales	7·77	8·06
Scotland	1·12	1·06
Ireland	1·55	0·98
France	11·20	8·76
Germany	13·54	14·52
Austria	6·63	6·38
Belgium	1·65	1·66
Hungary	4·71	4·67
Italy	8·52	7·75
Russia	25·82	29·13
All other countries	17·49	17·03
	100·00	100·00

What is the nature of the difficulties to which these facts give rise? It must be remembered that we are for the moment considering that the increases in population just described are justified, and, therefore, inevitable if the different countries are to reap the fullest possible advantages from the economic situation. With increases in population which are not justified — with over-population — we deal below. These difficulties centre round the question of power and prestige. Other things being equal, the larger the population of a country the more powerful is it and the greater the prestige it has. And among the fully industrialized countries of Western Europe other things are more or less equal, and in consequence those countries among them which have the largest populations are the most powerful and cut the biggest figure in the eyes of the world. The story of the Big Four is very instructive. The proceedings

[1] Newsholme, *Vital Statistics*, p. 54.

at Versailles in 1919 began as a Conference of thirty-two nations. The Conference was soon reduced to a Council of Ten and then to a Council of Four—the Big Four—rightly so called because of the size of their populations. They were America, Britain, France, and Italy. The same principle can be seen at work in any international conference. It plays a great part in the proceedings of the League of Nations. The Council of the League is largely in the hands of the big nations.

There is nothing mysterious about the advantage which numbers give. Behind the representatives of the big nations at the international conferences are the big battalions. Numbers make possible the exertion of force. But they do more. Nations possess certain unique elements of civilization around which sentiment gathers. There is something distinctive in English literature and in English manners and something equally distinctive in French literature and French manners. Englishmen and Frenchmen naturally wish to see the widest scope for their ideals and customs. French used to be at one time the diplomatic language of Europe. It is losing this position, and we may attribute this in large part to the fact that since the eighteenth century the population of other European countries has increased faster than that of France. Now let us for the moment imagine that the relative position of the population of different countries does not change. The fact that some countries are more populous than others would still be a cause of friction. Friction arises from motives, some of which are good and some of which are bad. As an example of the latter, international bullying is encouraged and in fact only too often occurs. The big nation is tempted to wave the big stick. The remedy must be on the lines of the remedy adopted within the limits of different states. The collective force of the community is used to restrain the individual bully and the collective force of the different states in the world must

be organized to restrain the state who would play the bully. But the conditions do not always arouse motives which are wholly bad. The small nation which feels that it has something unique to contribute to the civilization of the world may feel itself to be in an uncomfortable, perhaps even in a galling, position, since from the big nations it gets no attention. The remedy must be much fuller international intercourse and a shedding of the vulgar ideals of nationalism which cause the big nations to seek to impose their ideals upon the small nations rather than to learn from them. It may be that, if the prospects of permanent peace grow brighter, the motives now leading the larger states to cohere together as organized and uniform systems, for the sake of the power which such systems give, will grow less. Out of such states might develop a number of communities of smaller size, and this development, if not accompanied by the erection of artificial barriers, might lead to the enrichment of civilization by the rise or formation of new centres having unique elements of civilization of their own, and (incidentally) might place the existing small states in less galling positions than those which they now occupy.

The most frequent and the most pressing difficulties, however, are not due to permanent differences between the sizes of nations but to the changes in the relative positions of nations in respect of their population. That such changes are many and frequent we have already seen. The friction that such changes may cause was vividly brought home to the present writer during the week before the outbreak of war in 1914. He was staying in a hotel on the frontier between France and Switzerland. The prospect of war seemed far more real on the Continent than it did in England, and the conversation with some Swedes who were staying in the hotel naturally turned upon the possibility of war. The Swedes were strongly pro-German and anti-Russian, and on asking for the reason the

present writer found that the apparently menacing increase in the population of Russia was uppermost in the minds of the Swedes. For years they had been looking across their eastern frontier and witnessing with alarm the addition of millions to the population of Russia. Thus can different rates of increase generate friction. And the reactions which they may have are very various. Witness the change in the relations between Great Britain and Ireland. In 1821 the population of Great Britain was about 14 millions and that of Ireland a little under 7 millions. In 1921 the population of Great Britain was between 42 and 43 millions and that of Ireland something over 4 millions. A hundred years ago the population of Ireland was half that of Great Britain; now it is a tenth. This change has had no little to do with the change in the attitude of Great Britain to Ireland. Great Britain can now afford to do what was formerly impossible—to look complacently upon the independence and possible hostility of Ireland.

The relation of Great Britain to her colonies forms a similar study in the reactions caused by different rates of increase. Had the stupid mismanagement of our relations with America not led to the attainment of independence by the United States in the eighteenth century, and had friendly relations continued while the population of America grew, what would have happened? It would have been largely a problem of population. The population of the United States exceeded that of England soon after 1870. Could loyalty to a common system have been maintained? It is doubtful; at least it would have been put to a severe strain. There would doubtless have been a claim to shift the centre of authority across the Atlantic to mark the shifting of the centre of gravity of the population. And such a claim would have met with resistance at home. If things go on as they are, if Canada and Australia continue to fill up with men of our race retaining their present

position in the imperial system, then some day a problem of population of this kind may have to be faced by our descendants.

But it is in the relations between France and Germany that we can see better than anywhere else the reactions caused by different rates of increase in two neighbouring countries. The diagram on p. 76 shows that about 1860 the population of Germany surpassed that of France. The two countries have followed very different paths. France has remained more or less self-supporting. Foreign trade does not form an essential feature of her existence. Several causes, among which the system whereby the land is divided up at death plays an important part, have combined to keep the birth-rate low. Germany, on the other hand, has made great efforts to develop foreign trade and has built up a system whereby she imports a considerable quantity of food in return for manufactured goods which she exports. Many influences combined to favour a high birth-rate, and Germans came to glory in their rapidly increasing population and to regard it as a sign of the vitality of their country. No one who was in the habit of travelling in France before the war could have failed to become aware of the reaction that this situation was producing upon the relations between the two countries. The French were nervously apprehensive; year by year great additions were made to the German population, whereas that of France remained nearly stationary. The Germans, growing more and more confident, did not disguise their view that war was in itself not on the whole a bad thing, and made it evident that if they did not get their way international difficulties might end in war. The growing international tension in the years preceding the war may be traced in large part to the friction produced by different rates of increase in different countries, and these different rates may, it should be noted, have been largely if not wholly

justified by economic conditions. The friction was not necessarily due at all to 'over-population'.

The war, it is hardly necessary to say, has not made matters any better. In 1921 France had a population of 39 millions and an area of nearly 213,000 square miles. She had gained by annexations a population of 1,700,000 and an area of 5,600 square miles. In 1919 Germany had a population of just under 60 millions and an area of 182,000 square miles. She had lost a population of 6,471,000 and an area of 27,000 square miles. But the French are as apprehensive as ever; they fear a war of revenge with a nation which has 20 million more members than they have. The whole European situation is dominated by the anxiety which the French feel on this score. They have been driven to adopt what is bound to be the perfectly futile expedient of trying to increase their birth-rate—futile, that is to say, if it is hoped by such measures to make any serious approach to equalizing the numbers of Frenchmen and Germans. To this end the sale of contraceptives has been prohibited and taxation has been remitted and benefits granted to fathers of large families. Any one who reads current French newspapers must have noticed the amount of attention devoted to these matters and the anxiety displayed on the subject of the birth-rate; parents with large families are held up to public admiration and photographs are published of members of the League of the Fathers of Large Families.

There is only one remedy for the friction produced by different rates of increase, and that is the remedy already alluded to. There must be some form of international guarantee whereby smaller nations may rest assured that their rights will be respected and that they will not be bullied. Could such an assurance have been given to France after the end of the war, the present international situation might have been very different. It is galling for a nation—which, owing to the

increase of other nations, is becoming relatively less important—to see its influence in the world declining, so far, that is to say, as influence depends upon numbers. But such changes are inevitable, and they occur not only between nations but between larger groupings of mankind. The following figures have, for instance, been given for changes in the constitution of the population of Europe. Out of 1,000 inhabitants there were in the years named the following proportion of Teutonic, Romance, and Slav elements:

	1801.	*1850.*	*1905.*
Teutonic	375	369	273
Romance	355	321	251
Slav	268	310	375

Similarly, taking a still wider view, we find that the rates of increase of different continents are very dissimilar, and that, therefore, in some measure their relative importance in world affairs is changing. The following table brings this out and also shows that the white races are not maintaining their position.

WORLD POPULATION

	1910. *Thousands.*	*1920.* *Thousands.*	*Increase.* *Thousands.*	*Increase.* *Per cent.*
Europe . . .	647,348	652,170	4,822	1·0
America . . .	180,397	207,909	27,512	15·2
Africa . . .	126,854	132,580	5,726	4·5
Asia . . .	858,497	990,809	132,312	15·4
Oceana . . .	6,866	8,096	1,230	18·0
	1,820,094	1,991,496		

So long, however, as the element which is relatively declining can be guaranteed against aggression, international friction should be greatly lessened. War at least is no remedy. As things are, nations are disposed towards war by these changes. But they gain nothing by it. Germany lost territory owing to the war and France gained territory, but the transfer of territory was made because, or at least on the assumption that,

the inhabitants passing under the authority of the new state had greater social and cultural affinities with the inhabitants of the new state than with the inhabitants of the state to which they previously owed allegiance. No one imagines nowadays that war between nations long settled in their territories could end in the annexation of territory belonging to the conquered state, in the driving out of the previous inhabitants and in the settling there of members of the victorious state. The French do not contemplate driving out the Germans *en masse* from the Rhine provinces and the planting of Frenchmen there ; the most they contemplate is that by the occupation of these provinces they may prevent a considerable number of Germans from serving in the German army. War, therefore, leaving aside the loss and misery caused by it, fails wholly as a remedy. The French have got to face the fact that there are, and will indefinitely continue to be, more Germans than Frenchmen ; and the world has got to discover means of removing, or at least of lessening, the friction caused by this fact, which may otherwise lead to more wars—futile as they are bound to be.

Friction between nations having its source in problems of population does not always take this relatively simple form. The facts described may dominate the situation in the background, but friction generating sufficient heat to be dangerous often arises in such a manner that the connexion of population with the matter is no longer apparent. It has frequently been noticed that in the twenty years before the war international difficulties which not infrequently assumed the form of ' crises ' centred round some miserable spot in a tropical or semi-tropical country. Why should Fashoda, or some other collection of wretched hovels in a distant land wholly unsuited to European settlement, be able to cause the nations to rage so furiously together? A little inquiry shows that, wherever these disputes flared up, attempts to capture markets had almost always

something to do with them. Free ports in China, railway concessions in the Near East, trading privileges in Morocco, wherever we look we find attempts to capture markets going on, and now and then a collision between the competitors occurring—sometimes at a miserable poverty-stricken village which never looked as though it could be destined to play any part in high international politics. But what drives nations to look for markets abroad? It is the desire to expand the system of selling manufactured goods in return for food upon which the structure of the most highly industrialized countries is based. If Germany can ensure for herself a market for her steel rails and other railway material required for the Bagdad Railway, she will ensure that food of equivalent value will, though perhaps indirectly, flow back into Germany. Now she could not have produced this food in Germany as cheaply as she could produce the railway material, and thus by capturing foreign markets she is able to justify a greater increase in her population than she would otherwise have been able to do. In other words, these conflicts over foreign markets have their origin in attempts made by highly industrialized countries to build up a system whereby their home population can be justifiably increased and, to the extent to which power and prestige go with a large population, thereby their position in the world may be enhanced. Now it is sometimes assumed that countries only make these efforts to capture markets when they are forced to do so in order to provide for excessive population at home; these conflicts are thus assumed to be evidence of over-population. But while it is possible that over-population might form an extra stimulus to induce nations to enter this form of competition, it is clear that they not only might but do enter upon it without any such stimulus. This has been evidently the case with Germany, whose motive was to enhance her position in the world.

Friction generated between nations who fear changes in the balance of power which changes in population may bring about is thus apt to cause a dangerous degree of heat to be reached in this competition for markets. What is to be the remedy? These conflicts, it is to be observed, arise in territories where there is no government which can make itself respected—in Persia for instance. They do not arise in Japan now, typically Oriental nation as she is, simply because she is not weak and unorganized. The weak and unorganized nations from whom privileges can be extorted are permanent danger-spots to the peace of the world. Any progress in the direction of organization and increase of self-respect will help to eliminate this source of danger. But so long as some countries fall short in these respects we can only rely upon international co-operation to prevent, or at least to adjust, these disputes, and upon the system of mandates whereby certain territories, whose inhabitants are at present incapable of looking after themselves, are for a time placed under the tutelage of more advanced countries.

Unhappily these are not the only ways in which the problem of population leads to international friction and thus threatens to be the cause of war. In addition to the long-settled countries which, as we have seen, it is not possible for a conquering nation to annex, depopulate, and fill with its own nationals, there are the recently settled and, in consequence, half-empty countries. It so happens that by far the greater part of the half-empty territory in the world which is suitable to form a home for the white man is included within the British Empire. Thus the problem which its existence creates is of the utmost interest to us.

The position of these territories, very briefly put, is as follows. If Australia and Canada had possessed a white population a thousand years ago, and had they pursued a similar course of economic development, their population would have grown,

as that of England has grown, until at the present day Canada and Australia would each have had between 50 and 100 million inhabitants. They would have been as full now as England is. But, as every one knows, history has not followed this course. To-day Canada has about 8 and Australia about 5 million inhabitants. Nevertheless, while with our present resources in the shape of methods of production a population of over 50 millions is possible in both countries, they could not be filled up to this extent at once. Even supposing that surplus millions exist elsewhere, and that transport for them could be provided, they would starve if suddenly transported there.

Development must be gradual; the country must be opened up, roads made, houses built, harbours constructed. The problem is whether development could not proceed more rapidly. It is often forgotten that the population of these countries is increasing rapidly. At the present rate of increase, to which immigration as well as the excess of births over deaths contributes, the population of Canada will double itself in 24 years and that of Australia in 34 years. If this rate of increase should continue for 100 years Canada would have 130 millions and Australia 40 millions. The conclusion usually reached is that, while now, and for some years to come, the population of these countries might justifiably increase somewhat more quickly, there is no scope for any considerable quickening of the rate of increase. This means that, supposing the natural rate of increase in these countries to remain as it is now, there is room for more immigrants of white stock than now arrive. But the number of additional immigrants who could be taken is not large.

Projects of emigration to relieve conditions in this country and schemes for Empire settlement arouse much discussion at the present day. It should be said at once that the ideal of filling up these territories with men of our race is one that

should commend itself to all of us. If we believe that the native characteristics of the British, their ideals and their habits of life, possess no small value for civilization, we must hope that this unique opportunity of putting wide territories under their influence, and of raising the proportion which men of British race bear to the population of the world, will not be lost. If we believe, as there is reason to do, that British influence in the world tends towards peace and fair play, we may hope that the filling up of these territories with men of our race will render a powerful British Empire able to exert a decisive influence against the forces which threaten civilization to-day. Therefore it should be understood that, if we cannot agree with some of those who see in emigration from this country to the Dominions a remedy for the evils from which both partners to the transaction are suffering, it is not because we have no sympathy with their ideals.

The scheme given effect to by Parliament in 1922 authorized the expenditure of up to £3,000,000 a year to assist emigration from this country to the Dominions. It was thought that between 60,000 and 80,000 persons might thus be assisted to move annually. It is probable that Canada and Australia could absorb between them more than this number of immigrants a year provided that they were of the right type. But it must not be forgotten that the provision of transport, especially for the long voyage to Australia, presents a difficulty even for this number. The more serious difficulty, however, arises from the fact that only a certain type of immigrant is suitable. It is the country districts in the Dominions which require developing; the proportion of urban population to rural population is already excessive, especially in Australia. In this country there is no surplus of agricultural labourers. Emigrants must be drawn from the towns and only a small proportion of our adult town dwellers would ever make a success of country

life in the Dominions. Experience seems to show that the most hopeful plan is to assist boys from the towns to emigrate. Even though they have been brought up in towns, they are young enough to learn to adapt themselves to a country life, to absorb the traditions and outlook of Canadians and Australians, and so to fit in with those among whom their lives are to be spent. Looking at these plans for Empire settlement from the point of view of the Dominions we see that any shifting of population on a very much larger scale than was going on before the war is neither practicable nor desirable.

These schemes must also be considered from the point of view of the other party to the transaction. Not infrequently they are advocated as remedies for unemployment and over-population in this country. Waiving the question as to whether or not over-population in the true sense of the word exists in this country, a glance at the figures will show that the volume of emigration which is practicable and desirable is small when compared with the present annual excess of births over deaths in this country and with the number of work-people who have recently been unemployed. The annual increase of the population in England and Wales amounts to nearly 400,000 and the number of those registered as unemployed (which is considerably below the number actually unemployed) has recently exceeded a million and a quarter. Beside these figures we must place the estimate of 60,000 to 80,000 as the number of emigrants whom the recent scheme is estimated to assist. But they are not the only considerations which should be borne in mind when looking at the problem from the point of view of Great Britain. The Dominions will only take those who are mentally and physically above the average of our population. Our population is thus left definitely poorer as a result of the selection of the fittest for emigration. Further, upon this country lies the burden of educating those boys who emigrate and

providing for them during youth. The probable effect also of such a movement upon population in this country and upon the economic development of the Dominions must not be left out of account. It is by no means certain that the effect of a regular movement of 100,000 or so yearly from this country would not tend to stimulate, at least in some degree, the birth-rate in such a fashion as to counteract any beneficial effect which such a movement is often supposed to promote. Again, the supposition that emigrants from this country would permanently engage in agriculture in the Dominions and thus promote the system whereby we in this country obtain food in return for manufactured articles required by those in the Dominions is open to doubt. For one thing those who live in the Dominions are at liberty to purchase manufactured articles from America and elsewhere, and in fact already do so on a large scale, and for another they are inclined to adopt measures to promote manufactures in their own territories. Therefore, while the project of filling up these half-empty lands with men of our race may commend itself to us, the effects which it will have require the most careful investigation and, more important still, it does not offer any avenue of escape from problems of population which press themselves upon us at home.

What effect has the existence of these sparsely peopled lands—and their relation to Great Britain—upon international policy? In the eyes of a German before the war his country was unfavourably situated. On one side was Russia with her rapidly increasing population. On the other side was England who, having entered the field earlier, had obtained those huge territories where the future position of the British people could be assured. Germans were confined to Germany if they wished to dwell in a land suitable for white men and remain under the German flag. They were, of course, free to emigrate, and Germans emigrated to America in some numbers and to

the British Dominions on a much smaller scale. But the Germans who did so very soon lost all sentiments of loyalty to their home land and were lost so far as the promotion of what Germany stood for in the world was concerned. Thus a feeling of resentment was generated in Germany against this country and played some part in nourishing the state of mind which finally made it possible for the rulers of Germany to plunge into war.

Owing to the fact that Europeans from countries other than England so rapidly lose feelings of loyalty to their native lands and become in a short time 'good' Canadians and 'good' Australians, it has never been found necessary to restrict immigration of Europeans. This, however, did nothing to mollify the jealousy which the fortunate situation of Great Britain aroused. It has been quite otherwise with regard to Orientals. The Dominions have virtually prohibited the immigration of Orientals into their territories. Quite apart from the very natural desire to see British traditions flourishing over as wide an area as possible, this policy can be justified on the grounds that if a community is to be successful it must be sufficiently homogeneous. There must be a sufficient basis of common tradition, mode of life, and outlook. And there can be no such basis in a mixed population of white men and Orientals. The choice, therefore, lies between the exclusion of Orientals from these Dominions and the surrender of territory to them, and the latter alternative is unthinkable except under compulsion. In view of their present lack of organization, China and India are clearly incapable of attempting to appropriate territory by force. Japan alone is in a position to make such an attempt. There has been much speculation as to the possible development of Japanese policy in this matter. But there is very little evidence that an attempt to appropriate British territory forcibly has ever received any serious attention

from responsible Japanese statesmen. Japan is now, and will be for some time, engaged in looking after her interests in Korea and Manchuria; and thus, while the existence of half-empty lands may promote jealousy and friction between nations, there is happily no immediate likelihood of war on their account.

There are also vast territories which are not—except for small areas—fitted for Europeans, but which stand in a peculiar relation to the population problem. The greater part of Africa, for instance, is unsuited to European colonization; it is inhabited by negroid races living in a state of economic development so low that, while these lands—relatively to the stage of economic development reached—may be said to be fully populated, they are, in comparison with European and Asiatic countries, very sparsely populated. The climate is more suited to Indians and, while the exercise of force on the part of Indians to secure a footing is, of course, out of the question, a slow infiltration of Indians is in progress. This is giving rise to difficulties in Kenya and Natal, and is also creating serious friction between Great Britain and India. The problem is too involved to be discussed here, and we must be content with pointing out that the peculiar position of these African territories in respect of population is another source of international friction.

So far in this discussion we have left over-population out of account. We have seen that serious international difficulties, all having their origin in the population problem, may arise in many ways, even though there may be no over-population. Enough has been said to show that over-population may produce the most serious results. When we ask what effect it has upon international relations it is necessary to distinguish between comparatively slight over-population on the one hand, and gross over-population on the other hand. Let us take the case

of a country suffering from a certain degree of over-population. The standard of living would be depressed and social unrest prevalent. Any existing jealousy of countries more favourably placed would be intensified and proposals to try violent remedies would obtain a hearing. The government would be inclined to take strong action to secure foreign markets and, harassed by internal difficulties, might regard the threat to use force to obtain external advantages with less reluctance than would otherwise be the case. Thus in general we may say that over-population, while not in the strict sense of the word a cause of war, may intensify the difficulties mentioned above which, since they lead to international friction, at least predispose nations to war. Gross over-population, on the other hand, may be expected to have rather a different result. A great depression of the standard of living such as is produced by serious over-population leads to apathy and the loss of hope and enterprise. It is generally agreed that Ireland was considerably over-populated in the eighteenth century, and in a country so situated neither a strong government nor a clear national purpose can be expected to exist. There will probably be an unorganized drifting away of the people, who feel that wherever they go they can be no worse off than at home. But warfare, which is essentially an organized and co-operative effort, is not encouraged by these conditions.

There is a tendency to exaggerate the part which over-population has played in history, and to underestimate the importance of contact between peoples of different densities of population. As we look back into the past we find evidence of the migration of peoples to all parts of the world. Long before the dawn of history these movements had been in progress in every continent. Concerning the more recent movements we have some detailed knowledge, but for the most part we know nothing more than the fact, for example,

that people of certain racial characteristics must have worked from north to south in Africa. How far it was an organized movement, how far a mere progressive infiltration, how long it took, and whether it was accompanied by fighting we do not know. Nevertheless, a large number of writers have, without sufficient data, attributed these movements to over-population.

When we look into the circumstances connected with these movements of which we know some details, we discover that over-population but seldom plays a part. Two chief causes emerge. Some movements, as, for instance, the invasions of Islam, are to be attributed chiefly, if not wholly, to an idea. To put it briefly, the notion gained ground that something was to be gained by an organized movement, and there is no evidence whatever to show that it was an attempt to escape from the evils of over-population. In fact in this particular case it is well enough known just what it was that the movement hoped to achieve. Other movements have been initiated by progress in economic development. The population may become denser but not necessarily excessive ; there will be an increase in social solidity. We will suppose that this increasing population is agricultural, and that the neighbouring land is fertile ; suppose further that this neighbouring land is peopled by hunters with a much more sparse population. May we not expect to see a slow appropriation of land suitable for agriculture by the more highly skilled people ? The hunters could make no effective resistance. There would be no movement *en masse*, but merely a gradual extension of the agricultural people over suitable land. The slow movement of the Bantu races southward in Africa has probably been of this nature. In fact movements originating in this manner must have followed each great step forward in the attainment of man's control over nature.

There are thus at least these two causes of migration. We have little evidence that over-population has been of any con-

siderable importance in this respect. It is further rather difficult to see how these movements which occur at long intervals could be produced by over-population. Countries do not fill up, overflow, fill up again and again overflow as some writers seem to imagine. Except under very unusual circumstances they are always –relative to the stage of economic development reached by the inhabitants—either full or overfull. And there is no evidence that there is any tendency to pass from the full to the overfull condition at intervals, such as would account for the migrations of which we have evidence. But this does not mean that the consequences of over-population are not serious and that the dangers of over-population can be ignored. There is no aspect of national life into which it is more necessary to look closely than the question as to whether or not there are the right number of people. The position of this country has been discussed so far as space allows on the assumption that the right number of people is that which gives the largest income per head. It is now time to call attention to the fact that this is not the only criterion by which to judge whether there is in any given country the right number of people.

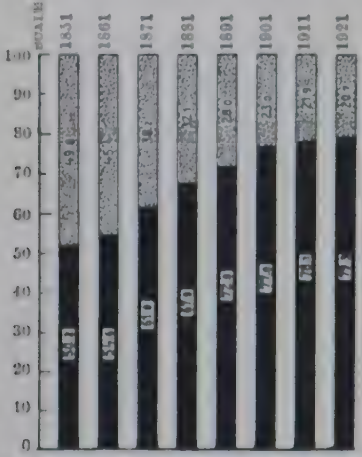
9

No limit can be set to the progress of scientific discovery and thus to the power to control his surroundings to which man may attain. It is possible that we shall some day be able to produce in the laboratory the food stuffs that we now raise in farm and garden. In order that the fullest advantage may be taken of these discoveries a continuous, though perhaps a slow, increase of population will be necessary. Without an increase in population some increase in wealth would follow upon the progress of science, but, if the largest possible increment in wealth is to be reaped

from this source, then population must continue to grow, much more slowly than at present perhaps, but with the inevitable result that sooner or later the whole of England will be classed as an ' urban ' as distinguished from a ' rural ' area. People will be better off but they will be tightly packed. Tight packing, however, is not pleasant ; it may be made healthy perhaps, by scientific progress in sanitation and in the control of disease, but it is clearly open to doubt whether these conditions could be rendered compatible with mental and social health. In any case there must clearly come a point where increments in wealth would be obtained only at the expense of human welfare in the widest sense of that term. There is obviously some limit to the tightness of the packing that we would tolerate, however rich it might make us. With this view there can be no disagreement, but to most men it will seem a problem of the remote future which can safely be left to look after itself. Is there not plenty of open space even in so densely populated a country as England? In view of the low average income which even our existing technique—vast improvement as it may be upon that of former times—enables us to enjoy, is it not desirable to concentrate our energies upon improving our technique and to view without alarm such increase in population as may enable us to make the fullest use of the same?

A closer examination of the situation in this country, however, may raise doubts. We may agree that we should make every effort to raise the average income which at present makes it impossible for a considerable fraction of the population to attain a decent standard of living. But it must not be forgotten that improved technique will increase our wealth without an increase in population, though we may not reap the fullest benefit without an increase. The problem is whether an increase in population may not involve more than proportionate losses in other directions.

Of all European countries this problem is most relevant to England and Wales. In 1921 the population of England and Wales amounted to 649 persons per square mile or rather more than 1 person to an acre, whereas in 1821 there were only 206 persons to a square mile. In 1920 Belgium had 634 persons to a square mile, in 1921 Holland had 554, in 1921 France had 184, in 1919 Germany had 328, and in 1921 Italy



had 337. Thus England and Wales is the most densely populated area in Europe. There are areas outside Europe with still denser populations; in 1920 Java had 689, and in 1921 Barbados had 940 persons to a square mile.

Figures giving the density of population in a country require further analysis before the conditions under which the inhabitants live can be brought home to us. We want some idea as to the extent to which they are crowded together into towns. Figures are available for most countries showing what percentage is living under 'urban' and what percentage under

'rural' conditions. Unfortunately different countries do not adopt the same method of distinguishing between 'urban' and 'rural' conditions, and, therefore, comparisons between different countries based upon these figures must be used with caution. In England the population living within 'urban sanitary districts' is classed as 'urban' and the rest as 'rural'. The following table shows the distribution of population in England and Wales as shown by the census of 1921.

Population of districts.	*Aggregate population in 1911.*	*Percentage of population in 1911.*
250,000 and upwards	9,147,488	25
100,000–250,000	4,546,594	13
50,000–100,000	3,556,927	10
20,000–50,000	4,622,484	13
10,000–20,000	3,256,011	9
3,000–10,000	2,643,738	7
Under 3,000	389,694	1
Total urban	28,162,936	78
Rural	7,907,556	22
Total population	36,070,492	100

In 1851 almost exactly half the population was rural and the percentage decrease in the rural population at each census is shown in the diagram on p. 97.[1] Leaving aside for a moment the interpretation of these figures, let us look at the conditions in other countries. In France about 46 per cent. of the population is classed as urban and 54 per cent. as rural—a remarkable contrast with this country even though the basis of classification is not strictly comparable. In the United States 51·4 per cent. is given as urban and 48·6 per cent. as rural, which is not so remarkable when we remember that the United States is still largely an undeveloped country. In India about 10 per cent. of the population is urban. But while this country has the largest proportion of town to country dwellers as calculated

[1] Newsholme, loc. cit. p. 39.

on any recognized basis of classification, it should not be supposed that there is any strict relation between a high density of population and a high proportion of town to country dwellers. Australia forms the most striking example of the truth of this statement. In that country there are only 1·8 persons to each square mile and yet rather more than half the whole population lives in five large cities, the smallest of which has a population of over 155,000. In Java, on the other hand, with 689 people to the square mile there is only one town with a population of over 100,000. Therefore, while there is some connexion between a high density of population and urbanization, there are countries with a sparse population and a high proportion of town to country dwellers and countries with a dense population and a low degree of urbanization.

The explanation is to be found in the fact that, in any case up to the present stage of industrial evolution, urbanization has followed the application of scientific methods to production. In some parts of the world there has been little or no such application, but the evolution of a system of very intensive agriculture—a kind of highly developed market-gardening—has made a very dense population possible. This, however, is not the line of evolution of which we are thinking when we are asking what are likely to be the results of further applications of science to problems of production. Therefore we need not discuss how far human welfare is endangered by mere density of population unaccompanied by urbanization.

Our problem is concerned with the relation of urbanization to human welfare. But it may be said that, although up to the present this line of development has always led to urbanization, it is not necessary that it should do so. Is it not possible to decentralize our industries? Now while certain modern developments—the possibility, for instance, of conveying electric power cheaply over long distances—favour decentralization, it

is more than doubtful whether the very great economic advantages which towns do and always will offer, especially in the sphere of distribution, will not continue to outweigh any advantages that future inventions might place to the credit of decentralization. In any case it is clear that towns will in a certain important respect remain advantageous and those who foresee de-urbanization as a natural result of future developments have no solid support for their belief. If we keep to facts, we see that towns exist, continue to grow, and the proportion of town to country dwellers continues to increase. What then is the influence of towns upon those who dwell in them?

Our existing cities can be improved out of all knowledge. They need not be the hideous conglomerations of mean and soot-laden streets that they are now. But in certain very important respects they will retain the characteristics which they now have. Let us suppose that the very desirable transformation of our cities from their present condition into that of garden cities has been accomplished. Those who live in them—or at least in cities above a certain size—will be excluded from living contact with the country. What then is this limit of size, and what influence do country conditions have upon people? The first question does not permit of any precise answer. Two towns may be about the same size, but while one is situated in the country twenty miles away from any town of comparable size, the other may be surrounded by a belt of similar towns. The relations of these two towns to the country are obviously very different. Putting aside these and other difficulties, let us ask whether life in a town of 50,000 inhabitants implies what are commonly regarded as urban conditions for the inhabitants. Barnsley, Oxford, Gloucester, Swindon, and Dudley are examples of towns of this size. They may be compared with towns of 100,000 inhabitants—St. Helens, Huddersfield, Wolverhampton, and Stockport for instance. When we

try to understand what life means to the ordinary city dweller in towns of increasing size, two things stand out. First, men are more and more completely dominated by all that industrialization stands for. It is impossible here to attempt any analysis of what industrialization means for those engaged in it, but it is important to remember that its essential features, the factory system and division of labour, have come to stay. The supersession of 'capitalism' by 'state socialism' or 'guild socialism' will necessarily leave the essential features of industrialization untouched. The structure of the industrial system may be so changed as to render the conditions it imposes less out of harmony with human needs than they now are. But certain necessary features of the industrial system will remain very difficult to harmonize with human requirements. This difficulty, however, is very much increased by the second characteristic of large towns—the exclusion of those who live in them from any effective contact with the country.

These two aspects of urban life may seem to have no bearing whatever one upon the other. How can exclusion from the country intensify the evils of industrial life? The answer is that they both put a serious strain upon human nature in somewhat the same direction until the tension caused approaches breaking-point. They both work in such a fashion as to render very difficult a well-balanced and harmonious development of human personality. Country life influences the physical as well as the mental side of human nature. We are apt to forget that our bodies were slowly evolved by a series of changes through millions of years which adapted our forefathers to meet what we may sum up as country conditions. Our senses are adapted to seize upon country sights, country sounds, and country smells, and, far-fetched as the suggestion may seem to many people, there is good reason to believe that, when our senses do not receive the stimuli which alone can

satisfy them, we are discontented. Our bodies are adapted to perform a certain amount of work in the open air, and failing suitable opportunities we cannot experience the sense of physical well-being that does so much to drive away discontent. Much deeper than that goes the influence of the country upon the other side of human nature. The country-side is a continuous revelation of beauty—' the self revelation of the creative spirit in its own works '. There can on this account alone be no compensation for the loss of effective contact with the country.

Urban life thus intensifies the one-sided development of human faculties that is an inevitable feature of industrial life. There are not present under these circumstances the conditions which favour the harmonious growth of human personality. As we have seen, there is at present no prospect of eradicating the fundamental evils of industrialism—however drastic an economic revolution may be effected—short of abandoning the application of scientific technique to production, which policy we are not contemplating. But if we could bring our town dwellers into living contact with the country we should introduce an element into their lives which would do much to counteract the influence of industrialism. It can be no mere accident that lecturers for the Workers' Education Association and others interested in similar movements have met with a more ready response in the smaller than in the larger industrial towns. In the former the growth of human personality has not been so stunted as in the latter. The smaller industrial town, like Swindon, is dominated by the country ; the larger industrial town has hidden the country out of sight. Now we cannot discuss the various possible developments here ; but if our former statement holds good—that with the present density of population in this country and the present degree of industrialization large towns are and will remain necessary—

then there are good grounds for asking whether a further development of urbanization in this country, however great an increase in wealth it might bring, might not fail to enhance the general welfare. There are now 38 per cent. of the population living in cities with 100,000 or more inhabitants each. The proportion of the population living under these conditions is rising. If our argument is sound, we are losing something. If we are gaining in wealth, is that sufficient compensation? It is not a matter concerning which we can reach a definite conclusion. It is not possible to measure increments or decreases in welfare as it is possible to measure changes in wealth. Opinion will differ, but it is at least a subject which demands the most anxious attention.

10

Hitherto we have been considering problems connected with the quantity of population; we have been inquiring how numbers are regulated and what is the right number of people under different circumstances and according to different conceptions of the standard by which we should be guided. There is another series of problems connected with the quality of population. We have devoted almost all our space to questions of quantity because it is of them that men are nearly always thinking when the population problem is discussed. But it would not be right to close any review of the field, which, however rapid, takes the form of a general survey, without some reference to the subject of quality.

Problems of quality arise because all men are not born with the same native endowment. Consider the characteristic of colour for instance; some men are endowed at birth with white skins, others with yellow, and others again with black skins. But this fact alone would not produce the problem

which confronts us. It is because men of different endowments make different contributions to succeeding generations that the problem assumes the form in which it presents itself to us. It may be, for example, that white men are increasing faster than yellow men, in which case the average native endowment of the population of the world is changing. Under such circumstances white men would come to form a larger proportion of the world population than before. The quality of the world population would change.

If we are not to be misled we must try and gain some clearer idea of what we mean by quality in the sense in which we have been using this word. By quality we do not necessarily mean the same thing as outward characteristics. We can measure or assess the characteristics of any man or woman, but without further analysis we are not entitled to say that these characteristics are an accurate measure of the innate qualities with which he or she is endowed. And this comes about because, while we now know that all men and women are born into the world endowed with potentialities in respect of all mental and physical characteristics, the characteristics which they show are due not merely to innate endowment but also in part to the influence of their surroundings. Let us take an example. We are all born into the world with an innate tendency to have small, medium-sized, or large feet. Now in certain parts of China women can, or could formerly, be found with very small feet. But the smallness of their feet is due, we find, not to any innate tendency to have very diminutive feet but to the habit of binding up, compressing, and so inhibiting the growth of the feet from an early age. This extreme example warns us that we must not jump to the conclusion that the characteristics we see are always due to an innate endowment which makes the development of such characteristics inevitable.

It is convenient to distinguish between mental and physical

characteristics, and, if we must make a generalization on a very complicated and difficult subject, we may say that the different physical characteristics we see in the men and women around us are usually to be traced to different innate endowments. People are tall or short, dark or light, have long or round heads, hooked, aquiline, or snub noses because they are innately endowed with these qualities, and not because they owe them to the peculiar circumstances with which they have come in contact. People also differ from one another in respect of their mental characteristics. Some are intelligent, others stupid; some possess in a marked degree a special faculty—musical talent it may be—while others are wholly deficient in it. Some people again are pugnacious, others timid; some are energetic, others lethargic. But we must be much more careful than when dealing with physical characters in attributing these differences to innate differences. Let there be no mistake, however; we do know that different people are differently endowed, but the expression of these endowments is, in a certain sense, more influenced by the conditions with which they have come in contact than is the case with physical qualities. A simple example will illustrate this. Suppose that in order to test the intelligence of two people we give them certain questions to answer in writing. It is obvious that, if one of the persons undergoing the test had never learnt to write properly or had half forgotten how to write, he would be very severely handicapped, and his answers would give no true guide to his innate intelligence. This kind of difficulty runs all through the estimation of mental qualities. Pugnacious people may have their natural pugnacity transformed in such a manner that the innate quality is not by any means evident on the surface. And this holds good of most mental qualities, whereas physical characters, the shape of the feet for instance, are seldom transformed in so striking a manner. This should not be taken as

meaning that the importance of innate mental qualities is on that account any the less, but that we should be on our guard against assuming that the mental differences which we observe at first sight are due to innate differences. The whole matter is of very great practical importance. Any one observing the Japanese before the opening of their country to foreign intercourse might have concluded that the Japanese had certain innate physical qualities, among them a yellow skin, and certain innate mental qualities, among them a lack of enterprise. We now know that, while he would have been right about the colour of the skin, he would have been wrong about lack of enterprise. The Japanese were only apparently lacking in enterprise; their social and political system inhibited the expression of the enterprise they possessed just as lack of ability to write inhibited in our imaginary example a man from showing his intelligence by answering questions on paper.

It is upon this foundation that we have to work—the knowledge given by modern biological science that different people are differently endowed in respect of mental and physical qualities. There are three ways in which the next generation may come to differ from the present generation in respect of its innate qualities. People having certain qualities may have more children than other people; this may be called reproductive selection. People having certain qualities may not on the average survive so often to reproductive age as other people; this we may call elimination. Thirdly, different forms of mating—close inbreeding, on the one hand, and crossing between different races, on the other hand—affect future generations. In earlier days elimination was more important than reproductive selection. Conditions were rough and men were more exposed to dangers—such as wild animals and extremes of heat and cold; those best suited to cope with these conditions survived, while the others were eliminated.

When war took the form of a struggle between man and man, we may assume that the stronger prevailed. Elimination is not absent to-day. Different people are differently susceptible to such a disease as tuberculosis, and the most susceptible tend to be eliminated. Reproductive selection, on the other hand, is more prominent to-day than formerly, though it is no new thing. In earlier days the chiefs often had many wives while common people had to content themselves with one; the chiefs, therefore, who were presumably somewhat different in respect of their innate qualities from the rest of the people, left more descendants than other people. Reproductive selection, though not exactly of this form, is very important to-day. A system of monogamy does not ensure an absence of reproductive selection, because certain kinds of people marry less than others and certain kinds have fewer children than others.

Changes in the quality of population are chiefly of interest as they affect any one country, because it is only such changes that are capable of being controlled. The population of Russia was before the war forming year by year a larger fraction of the whole population of the world. So far as the Russians are innately different from other people in their mental and physical qualities, as is no doubt to some extent the case, so far the average quality of the world population was changing. But these changes can hardly be controlled. How they arise we have seen; they are of great importance, but they give place in our interest to changes which affect us more closely and over which we could if we wished exert a very large degree of control.

In England to-day we are lending our energies to put a stop to elimination on account of any physical disability. We are endeavouring to render the chance of contracting disease less likely and to cure disease when contracted. Since our efforts

are meeting with a considerable measure of success, the result is that many people who would formerly have died of disease now survive. We are perhaps not so much changing the quality of the population as preventing it from changing as it would formerly have done by the disappearance of those subject to certain diseases. We are also endeavouring to place cripples, and others suffering from physical malformations, in as good a position as normal people. However we may regard such action, it ends in keeping people alive who would otherwise have died, and in enabling them to reproduce their kind ; and this is to change the quality of the population.

We are led to action of this kind on humanitarian grounds. Because our motives are of this nature, it is unlikely that, so long as social evolution continues in the direction in which it is now going, we shall pause in our campaign against elimination on account of physical disability. But it leads to certain difficulties. If we keep people alive who on account of a physical disability (say that form of blindness which is not the result of accident but of an innate tendency to blindness) might otherwise have died, and if they reproduce their kind, then there may be said to be a deterioration in the quality of our population. Blind people are not as efficient as normal people and they have not the same opportunities for leading happy lives. Now so far as the individuals assisted are concerned, there can be but one opinion. No assistance that it is within our power to give should be denied to them. But there is another point. If the disability means that the sufferer cannot lead a full life and cannot contribute by service to the community as much as a normal person can, and if it is known that a certain proportion of his children will inherit the disability, then surely his right to marry may be questioned. Where exactly this point should be raised calls for prolonged discussion. What we are concerned with here is that such evils as result from abolish-

ing or diminishing elimination may be counteracted in this manner.

Discussions about quality to-day chiefly centre round the result of reproductive selection. We have no exact knowledge of the extent of reproductive selection until we come to modern times and even with regard to the situation at the present day our information is scanty. The indications are that in England before the beginning of the last century the richer classes had at least as many children as the poorer classes. Evidence from other European countries goes to show that the former classes had more children and this may have been so also in England. In the earlier part of the last century there was very little difference between the birth-rates of the different classes in England. In the later part of the century the birth-rate of the richer classes began to decline. The decline has spread downwards. In the beginning of the present century the difference between the fertility of the various classes was very marked. In 1911 the births in England and Wales per 1,000 married men under 55 years of age, grouped according to the occupation of the father, were as follows :

1. Upper and middle classes	119
2. Intermediate	132
3. Skilled workmen	153
4. Intermediate	158
5. Unskilled workmen	213

But the proportion of children who died was not equal in the different classes, and, therefore, if we wish to calculate the difference in the extent to which the various classes were contributing to the next generation, we must allow for infant mortality. The infant mortality in these groups was as follows : 76·4, 106·4, 112·7, 121·5, 152·5. Putting these two series of figures together, we can calculate the proportion of infants born and surviving the first year of life in the different classes.

which works out thus: Class I, 110; Class II, 118; Class III, 136; Class IV, 139; Class V, 181.

So much for the facts. This great difference in the fertility of the different classes has become fairly widely known in recent years, but it can hardly be said that the discussion raised by the figures has resulted in any general agreement as to their interpretation. Passion and prejudice play a large part in these discussions. Some people refuse to see in the facts any importance whatever, while others discern imminent and inevitable decadence of the race. Those who desire to obtain a just view of the meaning of the facts will require answers to two questions. They will want to know first how far the different classes are distinguished by the possession of different innate qualities, and they will next ask how far the particular qualities characteristic of different classes are desirable or undesirable. The answer to the first question cannot be given until a thorough inquiry has been made by means of intelligence tests and other methods of measurement; while a beginning has been made in this direction the greater part of the work yet remains to be done. The attempt to assess the values of different qualities which has next to be made is more difficult than appears at first sight. It may be easy, for instance, to see that ability is of more value than mental deficiency, but it is not so easy to say how far ambition and self-assertiveness are desirable qualities in society.

The problem created by reproductive selection is of profound interest. It is also a matter of urgent importance that we should ascertain what effects it is producing, because, whatever these effects may be, they are being produced very swiftly. The contributions made by the different classes to the next generation are so out of proportion to the fraction which these classes now form of the population as a whole that, so far as the classes are distinguished by different qualities, the quality of

the whole population is rapidly changing. Both problems of quality and problems of quantity receive a large amount of attention to-day, but there is a tendency for those interested in one kind of problem unduly to neglect the other. We have to make up our minds not only how many people we want but what kind of people we want in this country. Any proposal relative to birth-control should, for instance, be considered in its bearing upon the quality as well as upon the quantity of the population. The two aspects of the population problem are so closely connected that almost any proposal put forward with one aspect of the problem in view will be found to bear directly or indirectly upon the other.

BIBLIOGRAPHY

Bonar, J. *Malthus and His Work.* George Allen & Unwin, Ltd., 2nd edition, 1924. Mr. Bonar gives a biography of Malthus and an admirable analysis of his writings and of the conditions under which he produced them.

Cox, Harold. *The Problem of Population.* Jonathan Cape, 1922. This book gives a short survey of the problem with particular reference to its bearing upon social questions of the day.

East, E. M. *Mankind at the Crossroads.* Charles Scribner's Sons, 1923. Many interesting facts are collected in this book which are otherwise difficult to obtain.

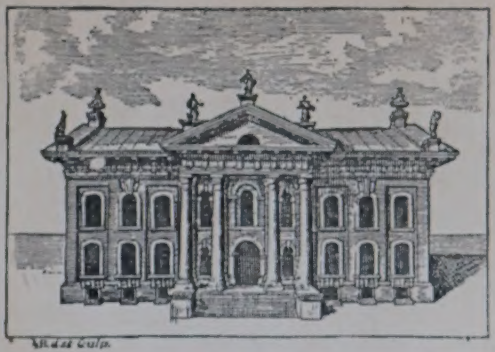
Malthus, T. R. *An Essay on the Principle of Population.* The sixth edition, the last revised by the author, has been reprinted by Messrs. Ward, Lock & Co., with an introduction by G. T. Bethany.

Newsholme, Sir A. *The Elements of Vital Statistics.* Revised edition, 1923. George Allen & Unwin, Ltd. This very valuable book contains a quantity of information concerning birth-rates, death-rates, infant mortality, density of population, presented in a form that is intelligible to those who have no previous knowledge of statistical methods.

Popenoe, P., and Johnson, R. H. *Applied Eugenics.* Macmillan, 1920. This book forms a good introduction to the study of the problem of the quality of population.

Wright, Harold. *Population.* Cambridge Economic Handbooks, No. 5. Nisbet & Co., Ltd., 1923. This handbook deals chiefly with the economics of population, and is perhaps the most generally useful book for those approaching the subject for the first time.

PRINTED IN ENGLAND
AT THE OXFORD UNIVERSITY PRESS



THE WORLD'S MANUALS

A NEW SERIES of introductory volumes, designed not only to give the student who is undertaking a special study some idea of the landmarks which will guide him, but to make provision for the great body of general readers who are sufficiently alive to the value of reading to welcome authoritative and scholarly work if it is presented to them in terms of its human interest and in a simple style and moderate compass. The judicious use of illustration distinguishes the series.

OXFORD UNIVERSITY PRESS
LONDON: HUMPHREY MILFORD

The World's Manuals

GENERAL EDITORS: CYRIL BAILEY, ERNEST BARKER, R. G. COLLINGWOOD, H. W. C. DAVIS, C. FOLIGNO, G. S. GORDON, O. J. R. HOWARTH, JULIAN HUXLEY, E. A. G. LAMBORN, R. W. LIVINGSTONE, P. E. MATHESON, C. T. ONIONS, W. D. ROSS, N. V. SIDGWICK, CHARLES SINGER, D. NICHOL SMITH.

Bound in cloth. Many volumes illustrated. **2s. 6d. net each.**

¶ History & Geography

Israel before Christ: An Account of Social and Religious Development in the Old Testament. By A. W. F. BLUNT.
Ancient Greece: A Study. By STANLEY CASSON.
The Growth of Rome. By P. E. MATHESON.
Roman Britain. By R. G. COLLINGWOOD.
The World About Us: A Study in Geographical Environment. By O. J. R. HOWARTH.
The Peoples of Europe. By H. J. FLEURE.
Europe Overseas. By J. A. WILLIAMSON.
The Expansion of Britain from the Age of the Discoveries: A Geographical History. By W. R. KERMACK.
The European States System: A Study of International Relations. By R. B. MOWAT.
The Crusades. By ERNEST BARKER.

¶ Art, Religion, & Philosophy

Greek Art and Architecture: Their Legacy to Us. By PERCY GARDNER and SIR REGINALD BLOMFIELD.
Greek Philosophy: An Introduction. By M. E. J. TAYLOR.
Ethics: An Historical Introduction. By STEPHEN WARD.
Introduction to Modern Philosophy. By C. E. M. JOAD.
Introduction to Modern Political Theory. By C. E. M. JOAD.
Outlines of a Philosophy of Art. By R. G. COLLINGWOOD.

¶ Language & Literature

Sound and Symbol in Chinese. By BERNHARD KARLGREN.
Persian Literature: An Introduction. By REUBEN LEVY.
The Genius of the Greek Drama: Three Plays. By C. E. ROBINSON.
The Writers of Rome. By J. WIGHT DUFF.
Italian Literature. By CESARE FOLIGNO.
Standard English. By T. NICKLIN.
Shakespeare: The Man and his Stage. By E. A. G. LAMBORN and G. B. HARRISON.
Modern Russian Literature. By D. S. MIRSKY. *Shortly.*
The Writers of Greece. By G. NORWOOD. *Shortly.*

¶ Science & the History of Science

Greek Biology and Greek Medicine. By CHARLES SINGER.
Mathematics and Physical Science in Classical Antiquity. Translated from the German of J. L. HEIBERG by D. C. MACGREGOR.
Chemistry to the Time of Dalton. By E. J. HOLMYARD.
History of Mathematics. By J. W. N. SULLIVAN. *Shortly*
Electricity. By L. SOUTHERNS. *Shortly.*

¶ Social Science (Law, Politics, & Economics)

A Short History of British Agriculture. By JOHN ORR.
Population. By A. M. CARR-SAUNDERS.

OXFORD UNIVERSITY PRESS

Feb. 1925

WITHDRAWN OCCIDENTAL COLLEGE LIBRARY

OCCIDENTAL COLLEGE LIBRARY
312 C319
Population, / Cal. - Sound
genst
3 5043 00161 2521